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As a tribute to Dolphin's hot new International Junior, and as a guide to the array of cutaways this month, Carlyle Blackwell took the photos that allowed Art Director Gene Butera to perform a down-the-middle dissection.

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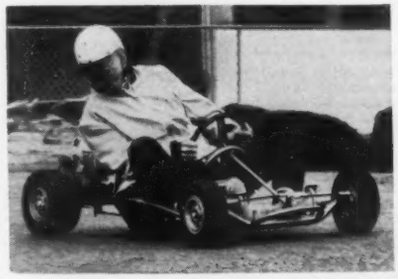
OBSERVATION AND OPINION

AVALANCHE OF ENTRIES – It goes without saying that I should thank all the readers who took the time to enter our Body Design Contest for the Weaver 1500 (C/D, May, 1961), but I must admit my feelings are mixed on the matter. As things stand at the moment, if many more entries are received they'll shove me right out of my office! This is written before the Contest deadline, so we haven't yet formally examined the entries, but we have noted a wealth of good ideas and postmarks as far afield as Germany, Mozambique and Australia. Many thanks to all who took part. We'll announce the winners in an early issue.

RACING'S FOURTH DIMENSION – The apprehensive-looking guy you see in the accompanying photograph is me, right foot flat on the loud pedal of a kart. It's the new model F-1000 racing kart by Blitz, a Long Island firm that specializes in competition karts. It was powered by a modest Clinton but it was quick enough around the twisty Blitz Kart Stadium to give me a good idea of what kart racing is all about. (I'd tried a kart before, but on Dean Moon's "Moonza" oval and not on a road course.)

What's it all about? It's about the most electrifying thing I've tried since the Birdcage Maserati, and *not*, as everybody says, because you're sitting out in the open and close to the ground. If you've driven fast at all, you know you're concentrating much more on the general shape of the car and its relation to the onrushing road than you are on your distance from the pavement or the wind in your hair. No, a kart feels blindingly fast because it *is* fast – in relation to the dimensions of the track.

Look at it this way. The Blitz Stadium circuit I used is ⅜ of a mile long, in the course of which there are three right-angle turns and two full hairpins, one of which wraps around 270 degrees. It's tight! The quickest karts lap it in 28 seconds, for an average speed of 47 mph. This doesn't sound sensational, but to get an idea of how this speed looks from the "cockpit", scale up the whole shebang to twice actual size. Double the kart's wheelbase would be 89 inches, about that of a sports car. Double the track's length would be ¾ of a mile, and with all its corners a formidably twisty circuit. Double the width of the road, the width of the kart—scale everything up to sports car proportions. To get the same sensation of speed you get in a kart, you'd have to lap this ¾-mile track in the same 28 seconds, or at an average of 94 mph! Let me assure you it would be impossible, even in a Ferrari 246-Sport, but if you could you would have some four seconds a lap to relax and the rest of the time you would be straining your reflexes to the limit to cope with the velocity at which the scenery streaks by. That's karting!



WILDER

PERSONNEL DEPARTMENT – Effective with this issue, Steve Wilder retires from the chair of Road Test Editor to indulge in a long-desired career of free-lancing. We've thus reactivated the post of Technical Editor and filled it with a writer/editor/technician of unusual ability: Jan P. Norbye. Jan has most recently been working with Volvo in Sweden on the service side; he has acted as team manager when Volvo has gone racing; he has written and edited in the automotive field both in England and in his native Norway. His first story for C/D is the report on the Monaco Grand Prix this month. Jan will be making the rounds of European races and factories before he comes over here, giving Jesse Alexander a chance to take a well-earned vacation. For the same purpose Pete Coltrin ably handled our coverage of the Sicilian races this month.

VICTORY BY MARK III – Stirling Moss's win at Monaco over the Ferrari team was a personal triumph of the grandest kind. Several readers have written to ask whether the infallible Moss is indeed a mechanism, as we reported in last June's C/D. Of course this Technical Report and cutaway were in jest. Let me assure you that Stirling Moss is fully as human as you or I * or I * or I * or I [Mr. Ludvigsen appears to have jammed at the keys here.—The Printer]

—Karl Ludvigsen

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Impossible.

A Volkswagen can't boil over.

It's physically impossible.

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Chances are you'll appreciate the air-cooled engine even more in winter. Air can't freeze any more than it can boil. So you don't need anti-freeze. (You couldn't put any in a VW even if you wanted to; there's no radiator. And so no hoses to leak. No draining. No flushing. No rust.)

In the past, a few VW owners have been amused to find a perplexed gas station attendant with a bucket of water and no place to put it.

But we've taken care of that in our '61 model. This year, a windshield washer is standard equipment.

It uses water.

Let the man fill it up.

LETTERS

SPRITE OWNERS' HINTS

We congratulate you on a fine article and a fine magazine. The Road Research Report on the Sprite was both timely and informative.

We have found some interesting additions to your comments and wish to pass them along.

1. The non-renewable air filters leave much to be desired in efficient operation. Two donut Micronite filters can be fitted without welding by cutting four 6-inch circles from stainless steel, cutting carburetor holes in one pair and a mounting bracket out of strip. A hole in the other pair serves to hold the filters on with wing nuts through the center mounting brackets.

2. The location of the coil (on top of the generator up to mid '59) has caused local repair shops some consternation. The vibrations of the generator as well as the engine combine to decrease coil life and it has proved beneficial to mount it elsewhere.

3. Some "running out of gas" has been experienced when cornering left, especially with a cold engine. This can be eliminated by reducing the length of the choke tubes.

4. A larger rear view mirror would meet with the highest approval on all BMC cars.

5. Side curtains' mounting brackets tend to scratch the aluminum strip on the door trim; some matching tape under the mounting screws is not too unsightly and will reduce the scratching.

6. There are some colors which are subject to fading. No doubt California offers harder conditions in this respect than Great Britian. One member (now on his second Sprite) insisted on a light shade for this reason. The shading effect on the boot (rear deck) can be reduced by permanently mounting the tonneau cover under the aluminum strip at the back of the driving compartment. Access to the boot is somewhat impaired unless the unused portion of the tonneau is cut off.

7. Wire wheels are an expensive option but a reasonably good substitute has been found in the use of the wheel hubs from a Sunbeam Alpine. Bolted on with the existing lug nuts, the new hub will take Alpine wire wheels at a considerable saving. Know where there's a good wrecked Alpine?

8. Matching paint on the gas tank makes a much better appearance when approaching a Sprite from the rear.

9. California owners should be advised of a new vehicle code requirement which prohibits the use of parking lights while running with headlights on. (This virtually eliminates fellow Sprite identity at night.) The simple modification is to unplug the *red* wire from switch to lights where the connection is made at bonnet mounting, permitting use of turn indicators only.

10. A larger hole in the transmission drive shaft tunnel makes lubrication of the front universal joint much easier. A hole the same size as the transmission oil filler hole can be cut and you can use the same rubber cover.

Sprite Owners Limited is very much interested to know of similar organizations across the country, activities etc. Those anxious to start clubs are welcome to our findings and assistance. On a well planned event, rally, tour, autocross economy run, etc., we can assemble thirty or more — an impressive sight — Sprites en masse.

Jack Sohn
Activities Chairman
Sprite Owners Limited
Box 238
Oakland, California

NO DRIVE SPROCKETS ON BMW

I read with great interest the fascinating story of Federico B. Kirbus about the magnificent mechanical achievements in the development of the motorcycle racing engines.

However the author got carried away with his colorful cycle lingo when he stated that the BMW eventually came through with some really astonishing power outputs, with as much as 95 bhp "through the drive sprockets". As far as I recollect, on the BMW the power was transmitted via a U-jointed driveshaft to a set of spiral-bevel gears onto the rear axle.

Congratulations on some fine articles and a splendid issue of the first CAR AND DRIVER.

George J. Lechner
Norwalk, Connecticut

BILL KRAUSE CITED

I have just finished reading your article, "Money Driver," in the April C/D. This is a most deserved and long overdue tribute to Bill Krause. He's a great guy and a terrific driver.

I'm a salesman and met Bill during a call at the machine shop where he works. I have watched his driving and most of his races for the past three years, telling everyone who would listen, that here was the greatest.

I think Mrs. Krause should be congratulated also. Her letter was really to the point — and so true.

Let's hear more about Bill from now on. If he drives in Europe let Brabham take to the hills.

Thank you.

Otto R. Schramm
Buena Park, California

ANGRY YOUNG MAN

I find it impossible to sit impassively under the fantastic slighting your publication is giving European racing.

Surely you, as supposed experts giving your country an idea of our type of racing, should not stoop to such short-sighted idiocy as is found only in certain contemporaries of yours. Enzo Ferrari certainly races in all Formulas anywhere, but he is financed to a great extent by Fiat so he can afford to. Compare that with the position of Cooper and Lotus. Both race on a veritable shoe-string, just about able to finance filling the fuel tanks. Cooper does nothing but build and race cars. Not really an enterprise to make millionaires out of Messrs. John and Charles overnight. Lotus, I grant you, does sell such cars as the Elite and the Seven, but they aren't produced in any great quantity. Of course not, they're quality.

In a position such as this, these firms must choose carefully the events they wish to attend. It is plain lunacy to enter cars in an event hundreds of miles away in which the cars might, if they even finished, be so fatigued that nothing short of an expensive re-build would make them raceworthy again. They may seem frail to some extent, but they surely seem to do the job over a great variety of circuits. Road racing in Europe is just what it says, racing on roads, not the rims of overgrown slop bowls and oval builders' yards.

I was appalled by your article of degeneration on Bill Krause. I fought down ideas that American racing car jockeys were leather-hided, bronco-busting, overalled cowboys some time ago only to have the whole thing stuffed down my throat with that story. I believed that those do-or-die stunts of coolly shoving the opposition off the course was a Hollywood gimmick. How wrong can one be? Cobber Brabham was right in his summing up of this immature, loud mouthed idiot whoever he may be in America. We have one or two of these smart boys over here, but they seldom get repeat rides if they are so willfully unsporting as your so-called stars are.

Your drivers who have come to England and Europe are damned good. Now we know why they came — to do some real racing. Phil Hill, Dan Gurney, Masten Gregory and Ritchie Ginther are first-class, but, oh, how I long to see Killer Krause over here. Troy Ruttman thought twice about coming back, didn't he?

Your big build-up for the Scarab was a bit premature too, wasn't it? I am not condemning Reventlow and Daigh but rather the publicity that gave them too high a peak to live up to. Let there be no mistake, everyone over here was with Reventlow all the way. When I saw Daigh third on the first lap at Goodwood on Easter Monday I was very happy for him, but guts, determination, driving skill and money are useless without the abilities of a designer who is conversant with the problems and able to get information first-hand from the battlefield. Still, good luck Scarab for the future!

Paul Harrington
Chatham, Kent
England

All this hypothesizing about the poor-boy status of Cooper and Lotus overlooks the fact that both Chapman and Cooper were quite willing to make the trip. Cooper was held up for lack of drivers; Chapman stated that insufficient time was available to prepare his cars. On Krause, we hope Bill goes racing in Europe too. It would settle a lot of arguments about the merits of this driver, just as it has for the other Americans you mention. On Scarab, and on the "big buildup" given this first American G.P. car in decades, don't we recall some highly chauvinistic premature publicity for a certain supercharged V16 that was to wipe up the best the continent could offer? With this we will forget about Monza, close this correspondence, and get on with the business of reporting on the first races of an exciting new Formula.

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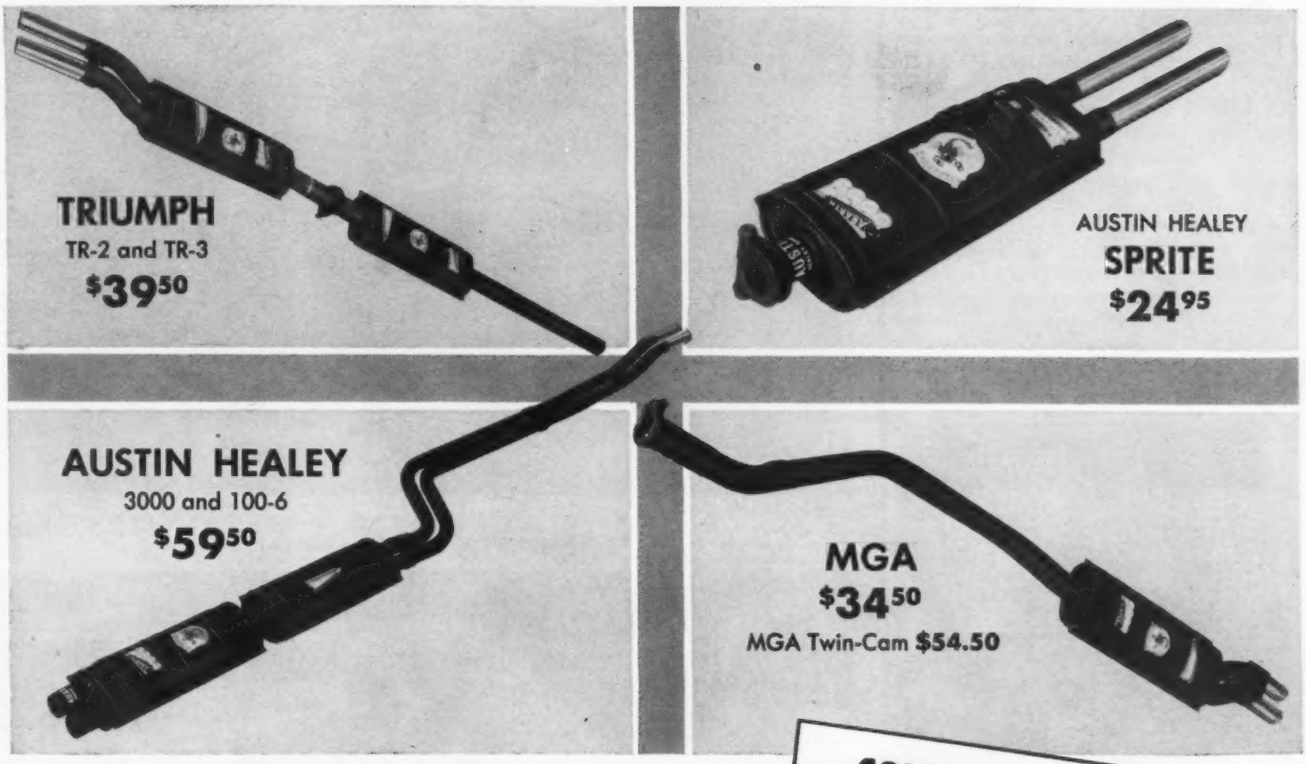

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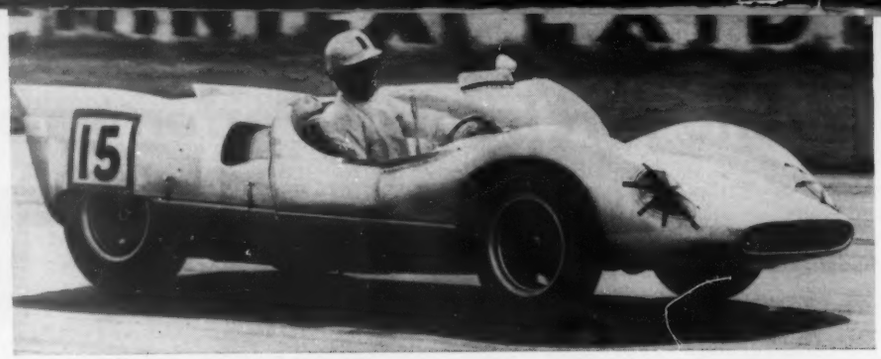
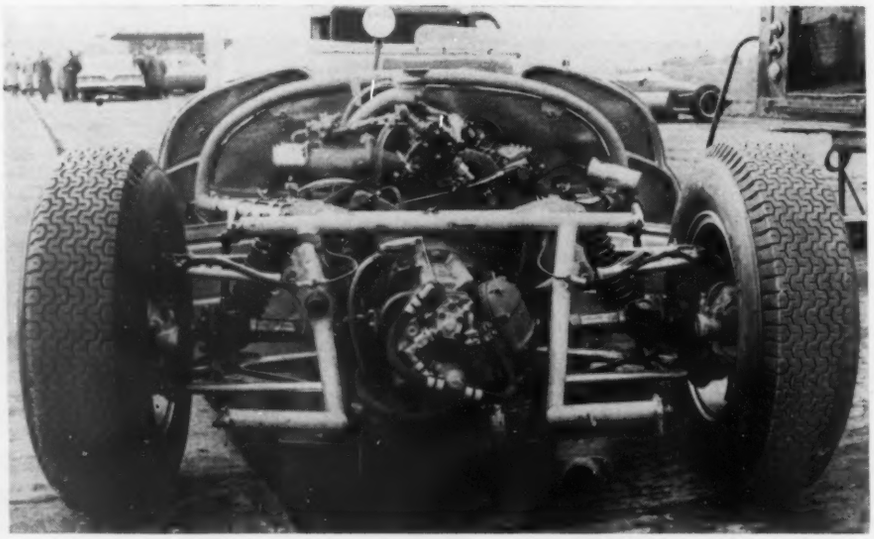
23 Additional Models Available — Write For Catalog

EUROPEAN NEWSLETTER



Second at Silverstone in May, behind Moss's Lotus XIX, was Salvadori in the new Cooper Monaco. Its new shape can be seen above, while below is its new G.P.-derived rear suspension and transmission.



PHIPPS

THREE-CARB HEALEY 3000 MK II

Onward and upward goes the performance curve of the Austin-Healey six. The latest model, the Mk. II, has more power and revised frontal styling. By adding a third semidowndraft S.U. carburetor, a warmer camshaft and stronger valve springs, BMC engineers have wooed an additional eight bhp out of the versatile C-series engine, supplying a net output of 132 bhp at 4750 rpm. Maximum torque, 160 lb-ft., comes in at 3000 rpm.

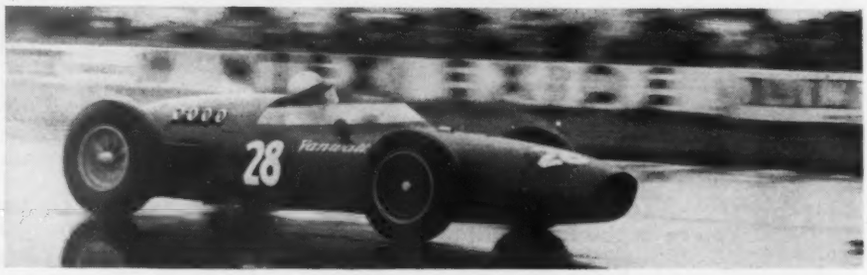
Results of the latest engine changes include a claimed reduction of 1.3 seconds from zero to 50 mph, one second saved to 90 mph and gas mileage that is said to

BENJAFIELD

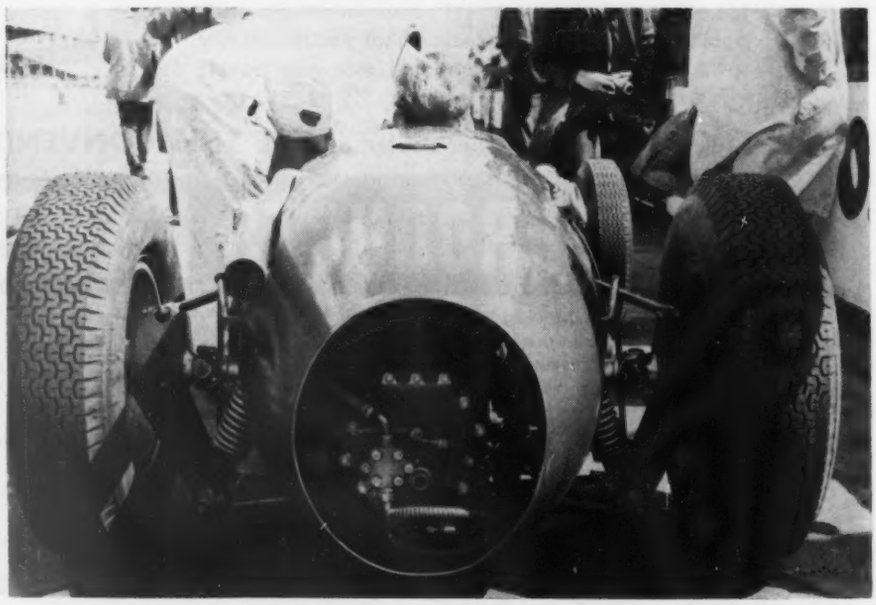
be appreciably improved, e.g. 23 miles per gallon at a constant 70 mph for the 3000 Mk. II compared to 19 for its predecessor.

Externally the Mk. II is distinguishable by its vertically-slatted grille. Safety belt mounting points are now standardized and the battery master switch in the trunk has been reinstated. Prices of the two and "four-seater" versions of the Mk. II are unchanged from the former models.

(*Continued on page 10*)



The new rear-engined Vanwall uses the famous Norton-inspired 2½-liter four in a new chassis based on Lotus designs. Surtees is driving above; the special Colotti-designed box can be seen below.



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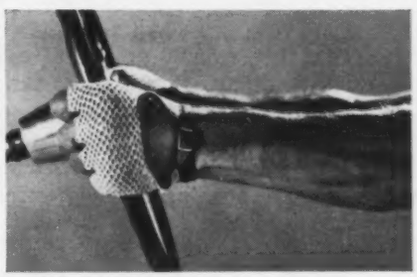

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SEBRING WON AGAIN ON DUNLOP TIRES

Hill-Gendebien Ferrari sets four new records in 12-hour Florida classic

SEBRING, FLA., (Special) — Dunlop tires carried Phil Hill and Olivier Gendebien to four important Sebring records when they drove a Ferrari to victory in the 12-hour Grand Prix of Endurance here this year.

1 A new *race* record — 210 laps (1,092 miles) at an average speed of 91.036 mph.

2 A new *lap* record (set by Hill) — a fastest-lap mark of 96.3 mph.

3 A new *driver* record — these two drivers are the only men to win this classic three times.

4 A new *tire* record — the victory of the Hill-Gendebien Ferrari made Dunlop the only tire in the world to win this Florida classic three years in a row!

Each of the first three cars in the 12-hour race — and each of the first three in the preceding Formula Junior 100-mile event — drove all the way on Dunlop tires. Dunlop "sweeps" like this are no coincidence. Look at the rest of the records:

Dunlop tires carried the cars that placed first, second and third in *all sixteen* 1959 and 1960 International World's Championship Formula I Grand Prix races. Dunlop tires carried the World's Champion Driver both years, too.

And Dunlop tires are specified as original equipment by the manufacturers of 67 different makes of car. (If you are driving an imported car, it probably arrived with Dunlop tires on it.)

You can rely on the testimony of the men who win the world's toughest automobile races, or you can take the word of the men who build some of the world's finest cars. You will know the real value of Dunlop mileage, safety, and comfort *best*, however, when you have a set of Dunlop tires installed on your own car. (If you try Dunlop once, you'll buy Dunlop again.)

DUNLOP

TIRE AND RUBBER CORPORATION

BUFFALO 5, NEW YORK

(Continued from page 8)

CITROEN'S MODEL A

Still another indication of rising prosperity in Europe is the recent introduction of a slicked-up successor to Citroën's low-cost, low-sex-appeal 2CV. Owners of the original *Deux Chevaux* are like parents of an ugly child – they will defend their offspring to the death, while subconsciously noting areas that could be improved upon. Called the Ami Six, the new car is powered by a 602 cc version of the old two-cylinder air-cooled flat twin. It produces 22 bhp at 5000 rpm, which pushes the better streamlined Ami up to a top speed of 66 mph. This heady performance, detailing of which will probably bring tears to the eyes of 2CV owners, is combined with refinements in the front-wheel-drive setup brought about by the use of double universal joints in the drive shafts. This re-engineered drive line goes a long way toward eliminating judder at the steering

As the Ami was announced, Frenchmen cried Enfin!

wheel during cornering and parking. Suspension remains the same as that used on the 2CV with the exception of adjustable shock absorbers.

Style-wise the new Citroën contains an echo of its big brothers, the DS and ID, with a dash of Ford Anglia (backward-slanting rear window), and Ford Taunus (rectangular headlights manufactured especially by Cibie for Citroën) thrown in. On the inside the Ami is a four seater with plush (by comparison) appointments covered by a fiberglass roof as in the Citroën DS. The dashboard layout is a cross between that found on the ID and the 2CV, with the gearshift lever sticking out as in the latter and the steering wheel shaped like that on the former. The seats are DS through and through, being made of billowy foam rubber. One criticism of the new design is the retention of the sliding windows. The doors seem to be thick enough to house windup windows and they should have been included in this step-up from the 2CV. They are undoubtedly included in the Mark II Ami, which is probably slated for introduction late in 1970. For the present, Ami occupants will have to depend for adequate ventilation on air coming in from a grille at the base of the windshield which then decants from vents in the dashboard.

DRIVING FIAT'S NEW 1300

Automotive history books will one day show that despite the fact that England "discovered" the disc brake, the Italians were the first to use them on a mass-produced medium-priced sedan as standard equipment. We are referring to the new four-door Fiat 1300-1500, equipped with Girling discs on the front wheels, now being marketed in Italy.

The new Fiat is powered by an all-new four-cylinder engine that comes in two sizes – 1295 cc and 1481 cc. Power output of the smaller one is 72 bhp, while the larger engine produces 80 bhp. Both powerplants use a single carburetor and seem to have considerable room for future power increases. Both are virtually four-cylinder versions of the 1800 and 2100 series. Both share the same drop-forged crankshaft with 63 mm diameter main bearing journals and 53 mm diameter crank pins.

Looking a bit like the Lark, Fiat's 1300 is among Europe's first to use quad headlights.

A production target of 600 cars a day has been set for the new 1300-1500 at Fiat's huge Mirafiori factory. This brings the Fiat range up to ten different models with the little 500 having the smallest price tag and the 2100 the largest. These new sedans reflect the increased standard of living in Europe. They are intended to plug the gap in the Fiat line between the aging 1100 sedan and the six-cylinder 1800 series. In a sense they might be thought of as European compacts, fashioned for the man who can afford a luxury car but doesn't want to pay the penalty of increased size in Europe's crowded cities.

On the road both cars are fast enough (87 mph top for the 1300 and 93 mph for the 1500, with zero to 60 times in the neighborhood of 22 seconds for the smaller engine and 18.5 seconds for the larger) to become non-blocking parts of the modern traffic flow. Both are equipped with pleasant, column-shifted four-speed gearboxes, while both are stable on the straight and flat in corners. The Girling discs are nat-

(*Continued on page 77*)

Our Apologies To SPORTS CAR GRAPHIC

Hi, there! Last month we ran a headline that we stocked everything for **Car and Driver** on **Road and Track** . . . and a lot of people thought we were plugging our favorite magazines. So that nobody feels left out, we dedicate the above line of type to whoever might be watching. What we were trying to get across was simply the message that if you want some accessory for yourself or your automobile, either for racing or pleasure motoring, the chances are good that we will have it. For the past eight years we have filled requests for merchandise from nearly every country this side of the Iron Curtain and for most of the big names you know in the autosport (we did it again!) fraternity. Join the club. Become hooked on trading at MG Mitten. Take advantage of our easy-going nature — we pay postage!

Note the Bill Parry Racing Coveralls, please.

These are brand new and, we believe, the ultimate in such garments. The pair I'm wearing (that's me at the left) is the two-piece model which, believe it or not, doesn't come all undone. The pants are roomy in the right place, the shirt is gathered and won't ride up. Sleeves are semi-raglan permitting activity without sloppiness. The zippered front has a button collar, open in the pits, closed in the car, wrists and ankles are elasticized. There is a multiplicity of pockets, four in all, each closed by a zipper. The one-piece type, worn here by Tony Settember, has the same features. (Frank Monise in the Lotus is in his B.V.D.'s but you can't see him, anyway). The suits are tailored from the lightest Dan River combed poplin (wt. 19 oz., most of which is zippers & belt buckle) a drip-dry, silicone-treated, wrinkle-shed material that takes fire-proofing beautifully. Colors are: White, Red, Blue, Black and Grey. Sizes: S, M, L, X-L and Long.

The price, sensational!..... **$16.95 ppd.**

SPECIAL: **Order this month and get a free embroidered pocket patch; specify make of car.**

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BUTTAFARRI SUN GLASSES are the final word in shades. They all have ground glass, (NOT plastic) optically perfect lenses to prevent eyestrain and have the "wrap-around" styling now recognized as superior in protection. Wonderfully light. Complete with case..... **$12.95 ppd.**

COMPETITION belt, 3" nylon web, Air Force quick-release metal-to-metal buckle, black only. **$16.95 ppd.**

DRIVING SHOES (illustrated above) **made to your order** in England from super-soft calf. Black with red or blue trim. Give shoe size and width, allow two weeks ..... **$12.95 ppd.**

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	Lightweight canvas DURICON Sun and dust cover	Water Repellent
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PIPELINE

President Kennedy may revive the tradition (if that's the word) of having a chief executive who drives his own car. Before his inauguration, news photos showed him at the wheel of his car (it appeared to be a Cadillac convertible). As if there were not enough issues surrounding the installation of a new President, let's raise the one of **the President's automobile.**

If, as it appears, President Kennedy is partial toward Cadillacs, what will happen to the specially-built plastic-topped Lincoln former President Eisenhower used? ETHYL NEWS, a magazine printed by the Ethyl Corporation of America, had some interesting statistics on motorized Presidents. It pointed out that the 11-year old "Sunshine Special" of Presidents Roosevelt and Truman traveled 55,000 miles before being retired to the Edison Institute Museum at Greenfield Village, Dearborn, Michigan. The car was a 9,300-pound luxury convertible (essentially Lincoln) built on a 160-inch chassis and featuring armor plate and bullet-proof windows. Perhaps Ike's Lincoln will be similarly retired though perhaps it will be felt to be more economical to retain the "Republican" car.

President Kennedy, according to ETHYL NEWS, is the 11th president of the automotive age but only the seventh to have ridden to his inauguration in a motor vehicle. Presidents (or their secret service guards) were noticeably reluctant to use cars. Thus, Warren G. Harding was the first President to be ushered into office in a car. Grover Cleveland was President when Frank Duryea made what is generally conceded to be the first successful move to motorize America in 1893. But Mr. Cleveland never rode in a car. In 1899 William McKinley took a ride in a Stanley Steamer but apparently didn't like it and admitted afterward he expected to be blown to bits at any minute.

Ex-Rough Rider Teddy Roosevelt remained faithful to the horse, but recognized the practicality of the car and rode in one occasionally. William Howard Taft brought a White Steamer to the White House and later acquired a Pierce-Arrow for his wife. Woodrow Wilson used an electric car but later shifted to gasoline types for more range.

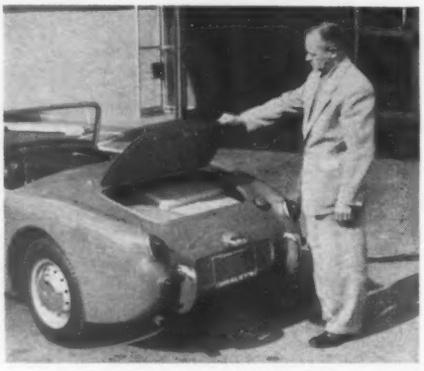
Harding knew how to drive and did so occasionally while in office. Silent Cal Coolidge rarely spoke at length to his chauffeurs but is said to have been a persistent back-seat driver.

For the past several years, Presidential automobiles have been leased from the manufacturers for $50 to $500 annually — a bargain, since the terms of the lease generally included service, tire replacement and repairs. The manufacturers are, however, prohibited from advertising the fact that the President uses one of their cars, unlike their counterparts in England where Daimler and now Rolls-Royce can proudly announce "By Appointment."

At present there are between 30 and 40 cars in the White House fleet. Recent Presidents have pretty much resigned themselves to being driven rather than doing the driving themselves. President Eisenhower, admiring cars at the GM Motorama in New York City, admitted he had not had a license in over 30 years, since as a General he was provided with a driver. FDR drove his own car, a specially-built phaeton with hand controls, on his Hyde Park estate and at Warm Springs, Georgia.

Harry Truman was clocked at 65 mph driving from Charlottesville, Virginia to Washington, D. C. Public reaction and the Secret Service persuaded him to let someone else handle the wheel after that. In the interest of security, the President and Vice-President never ride in the same car. As ETHYL NEWS pointed out, while the Secret Service's policies seem overly cautious, they have resulted in no President's having been injured while riding in an automobile . . . .

Kits for installing **trunk lids in Sprites** are available from Nor Cal, Dept. C/D,



Box 1928, Stockton, California for $59.95 each. The result is a functional, lockable, waterproof convenience. Nor Cal, incidentally, is a source for lots of **other Sprite goodies;** send for their catalog.

Lucas Electrical Services, suppliers of electric components for most, if not all, British cars, has opened a **new factory branch** in Englewood, New Jersey, at Van Nostrand Ave. and South Dean St. Lucas's executive offices will remain at 501-509 West 42nd St., New York City.

Looking for a home away from home when you're staying in London? We'd recommend the Headfort Place Hotel as **a spot for auto enthusiasts** to gather. Run by H. J. Morgan (general secretary of the British Automobile Racing Club) and his wife, it's located on Headfort Place, Hyde Park Corner, London S.W. 1, within easy reach of almost every place in London. If you want to phone from the airport, the number is BELgravia 2607. C/D readers have been assured of a personal welcome and it should be a good spot to glean the latest racing news.

Tires recapped in **Dunlop R1 and R5 racing treads** are available from Gardner-Reynolds, Inc., Dept. C/D, 4758 East Olympic Blvd., Los Angeles 22, California. They'll pay freight one-way on tires sent for recapping. Prices range from $14.95 to a maximum of $22.95 — send for the price list and details.

A handy solution to finding water suitable for use in car batteries is offered by the Ionette, a unit to **remove minerals from tap water.** Priced at $1.59 (replacement deionizer cartridges are 89 cents each) the Ionette dispenser is produced by the General Ionics Corporation, Dept. C/D, 101 Terence Drive, Pittsburgh 36, Pennsylvania.

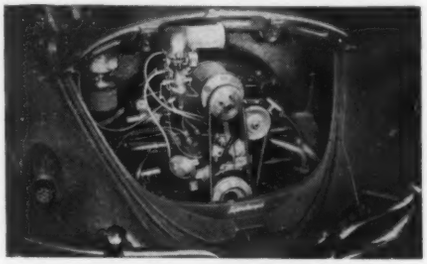
Those lucky C/D readers who're planning **a European trip** will be interested in this: The Royal Automobile Club, Pall Mall, London, S.W. 1, England, has written us that they would "be very pleased to supply the (1961 Motor Sports) Year Book to CAR AND DRIVER readers, the cost of which would be 2/6d per copy plus postage."

In our money that's about a third of a dollar, so 50¢ by check (not cash) should be fair enough. Or send a buck and ask for a couple of copies. If you're in a hurry, second-class air mail is 8/- or $1.12 for a total of about $1.50.

What is the Year Book? It lists *every* auto race and rally in England and all the National and International events on the continent and, in fact, everywhere in the world that goes along with the F.I.A. Also in this book are all the R.A.C.'s rules and regulations which should provide food for thought for club officials throughout the length and breadth of our fair land.

Attractive and ruggedly constructed, the **latest deerskin driving gloves** from D.R. Currie, Dept. C/D, Norwell, Massachusetts feature ventilated backs and palms. The gloves, among the best we've seen are butter soft, non-binding, nonslipping on the wheel and hard-wearing. Sizes 7 to 11½ are priced at $12.98 and feature elasticized backs and wrists.

Owners of **'61 Volkswagens** who've been waiting impatiently for a Judson supercharger for their engines (considerably revised from '60) may now unleash their checkbooks. Development and testing is



now complete and the blower is said to give a 45 percent increase in power delivered at the rear wheels. As before, the blower kit is completely bolt-on and the price is $144, F.O.B. Judson, Dept. C/D, Conshohocken, Pennsylvania. Add $15 for Karmann-Ghias and be sure to specify year as well as model (sedan, Kombi, K-G or what have you).

Working on your own car can be simplified by using a creeper. The Masonite Corp. says this one can be built for under $5.00. Make a 2-foot by 4-foot frame from 1 x 3-inch lumber, including a cross-brace in the center. Corrugated fasteners can simplify the construction. Then mount a ⅛-inch panel of Masonite pegboard, attach a caster at each corner and one in the center of the cross-brace. If you want, you can glue a piece of sponge or foam rubber for a head rest. —*HW*

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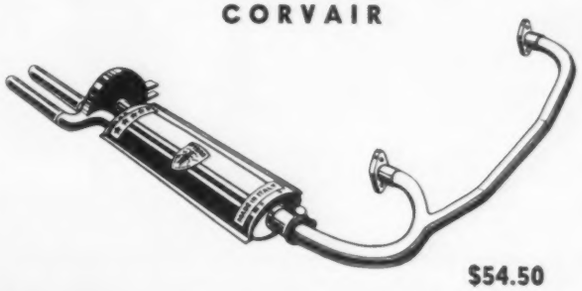

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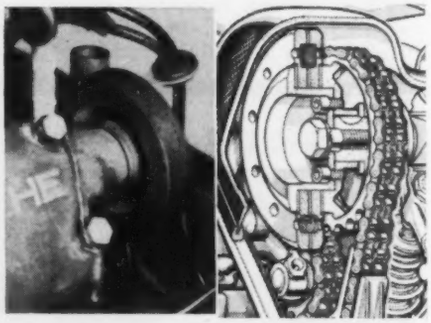
TECHNOTES

DAMPING THE CAMSHAFT

The four-cam Porsche Carrera engine has, as most of you know, a system of shafts and bevel gears to drive the camshafts. On each side a shaft extends out from the crankshaft to a pair of bevel gears on the exhaust camshaft. Another shaft then rises vertically from the exhaust bevels to another bevel pair on the intake camshaft. This drive sequence leaves the intake camshaft at the end of a long gear and shaft train which, under the influence of a bunch of valve springs and varying speeds and loadings, will tend to develop torsional vibrations or oscillations that impair timing and lead to component failure.

To keep these oscillations under control, Porsche has now experimentally fitted small torsional vibration dampers to the intake camshafts of a Carrera engine. They're mounted on the rear of the left-hand shaft (as our Coltrin photo shows)



and on the front of the right-hand shaft. This isn't a new idea, especially on German cars, for the Mercedes-Benz 300-series engine has such a damper—considerably larger—on the front end of its chain-driven single overhead cam (see drawing).

It seems that the Carrera arrangement of shafts, inherited from the Cisitalia-Porsche Type 360 design (C/D, April, 1961) hasn't proved entirely satisfactory, judging both by the above expedient and the fact that a new arrangement of the same components has been adopted for the flat-eight Porsche. It now appears that each of the four cams of this new engine has its own individual bevel-shaft drive direct from the crank center, without any "buck passing" between camshafts. This is akin to the arrangement used on the NSU Rennmax cycle engine shown on the lower left of page 39 of *C/D* for April, 1961. NSU later abandoned this method in favor of a combination of shafts and spur gears; perhaps Porsche will follow in the future.

IGNITION TIMING

The 1957 Austin-Healey 100-6 owner's manual specifies the timing at 5° ATDC fully retarded, while the shop manual lists 6° BTDC static! What is the difference between the two? When setting the timing

with a timing light, using a 500 rpm idle, where should the mark be to be correct — before or after?

Vernon Ernst
Lyons, Illinois

Assuming yours is a stock Healey, use the 6° BTDC static timing figure. The 5° ATDC is probably a misprint in the owner's manual as a fully retarded setting figure is quite unlikely. In addition, it is unnecessary and undesirable to time the Healey with a timing light, according to Ed Brown of Belleville, New Jersey whose shop specializes in making Healeys really perform. We checked with Ed for a reply to your question.

CORVAIR: 0-60, 13.5 SECONDS

I was pleasantly surprised to see excerpts from my letter on the Corvair Monza in the June issue of CAR AND DRIVER.

I cannot blame you for being a doubting Thomas, having been one myself for many years. However, the zero to 60 times of 13.5 seconds were checked and rechecked on a measured course with a stop watch and a F.Z. Sun tachometer. My speedometer indicates slightly over 62 mph at a true 60 and the tach indicates very nearly 2800 rpm at a true 60. I believe I'm correct in using the figure 21.6 mph per thousand rpm with a 3.27 to one final drive ratio.

A friend of mine who races Corvairs has decambered one of his cars by cutting off the bottom coils of the rear springs with gratifying results.

Maurice M. Scott
East Lansing, Michigan

300SL VS. 220SE

What is one to think when the highly touted 300SL is romped in its own element (a winding road) by a vehicle which should be something less than the ultimate in performance considering its specifications and designed purpose? (May, Teutonic T-Bird).

If we are to assume that modifications on Jesse Alexander's "very special" 300SL include disc brakes and the installation of the newer single-joint low-pivot swing axle, then it is certainly on equal ground with the 220SE in these respects. How, then, was this pinnacle of sports car design embarrassed by a machine embodying such detrimental factors (in this case) as longer wheelbase, higher center of gravity and less horsepower?

John Schlafer
Troy, New York

There are two answers here, general and particular. In general, some cars are better suited to twisty roads than others. The 300SL, with its high gearing and high polar moment of inertia, is definitely happier on fast sweepers than on very tight corners; driver ability counts a lot here, of course. In particular, Mercedes handling know-how has vastly advanced since 1951, when the 300SL was designed. Almost incredibly, Rudolf Uhlenhaut himself has said that in certain situations on the Mercedes test track, the standard 220 sedan will decisively outhandle the W196 Grand Prix car! If the road opens up at all, though, and the driver gets out of first gear, the 300SL or W196 will be long gone. (Actually, we think Jesse wasn't trying!)

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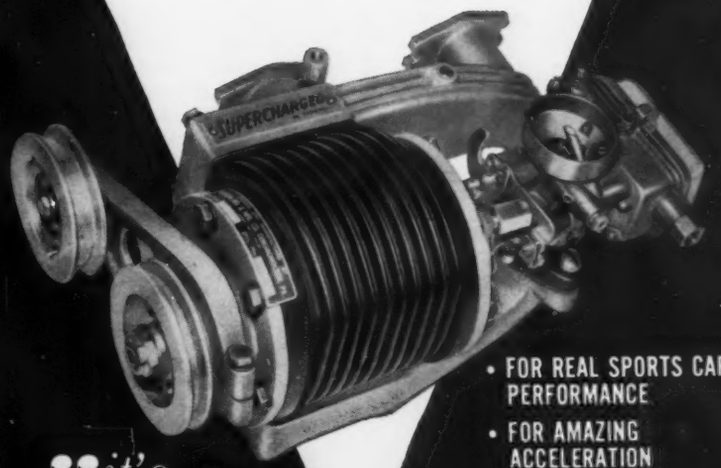

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DETROIT NEWSLETTER

by Roger Huntington

Readers interested in increasing the performance of compacts should consider the Paxton bolt-on supercharger kits. I've seen some pretty impressive results. You'll recall that this was the basic McCulloch centrifugal blower brought out in 1953, when most American cars were in the 100 to 200 bhp range. It did a good job then of boosting maximum bhp 35 to 40 percent with a modest pressure of 5 or 6 psi. But as passenger car engines got bigger, and breathing improved, the small impeller and casing passages just didn't have the air flow capacity to do the job. Even the redesign for the 1957 Ford power-pack didn't solve all the problems.

Today the Paxton supercharger seems to be just about ideal for the new compact engines under 250 cubic inches. Boosts up to 10 or 12 psi are available, and the air flow range is such that the compressor section is quite efficient—so power consumption and heat build-up are moderate. Paxton apparently can sell you a 40 to 60 percent power boost for about $300, with low-speed flexibility and fuel economy affected only slightly. One acquaintance got the following results on a mildly-modified '61 Corvair coupe with the 98-bhp engine, 4-speed transmission and 3.27 to one rear end (the engine still had the original displacement, hydraulic lifters and stock compression ratio):

	Unblown	*Blown*
0-30 mph	3.3 secs.	2.75 secs.
0-60 mph	10.2 secs.	6.2 secs.
Standing ¼ mile	17.95 secs.	15.65 secs.
Speed at ¼ mile	77 mph	90 mph
Max. bhp at clutch	100 @ 4600 rpm	165 @ 6000 rpm
Max. torque, lb-ft	155 @ 2600 rpm	155 @ 4000 rpm

Not bad for a little 145-cubic-inch Corvair. The bhp and torque figures were calculated from tests with an accelerometer and, I'm sure, are quite close. Incidentally, this performance was obtained with an indicated boost of 8.5 psi at 6200 rpm, which indicates that the blower is very efficient in this air flow range. Gas mileage is still over 20 mpg at 60 mph on the highway. Keep in mind, though, that the new Paxton blowers don't have the automatically-variable speed control that gives more or less constant boost pressure from the medium rev range up. The new ones have a constant speed ratio between impeller and crankshaft (vee-belt drive), so the pressure doesn't start to come up much below 3000 rpm and the maximum torque point is raised 'way up. On this Corvair the really wild performance range is between 4000 rpm and the valve float point at 6200.

But it goes . . . and I would think the Granatelli brothers, new owners of Paxton Products, might have a real seller here.

COMPACT COUNTER-REVOLUTION?

I wonder about the true significance of the recent boom in late-model used car sales. A year ago you couldn't give them away. People apparently preferred a brand-new compact or low-priced full-size car to a more luxurious late used model that would sell in the same price range (or maybe a bit less). This trend clobbered the used car market as well as medium-price new model sales. Today, it's the other way around. New-car sales in all price classes are below year-ago levels, while buyers flood the used car lots seeking "clean" late models with all the gadgets and half the gas mileage of the compacts.

Industry executives are watching the new trend closely. Is it just a temporary revolt against austere economy transportation as we pull out of an economic recession? Or is there a longer-term significance here? Obviously a lot of people who might have bought new compacts or stripped Chevrolets and Fords are buying "loaded" '59 and '60 Buicks, Oldsmobiles, Chev Impalas, Mercuries, etc. Their car payments will be the same, but these cars are *big* (getting to be a dirty word around Detroit) and they cost a lot to run. What does it mean? Have these people turned against *smaller* cars, or just against austere cars? Would they pay $400 more for a new *luxury* compact? Could these people ever be sold an even smaller car, the size of a Volkswagen?

Aren't you glad you're not an executive trying to dope out next year's model line-up?

UNIT CONSTRUCTION LIMITATIONS

I was surprised to read a technical report by Ford engineers saying unit body construction did not offer any clinching advantages for cars weighing more than 3200 pounds and not over 55 inches high. It was especially interesting since their own unit-construction Thunderbirds and Lincolns are in the 4000 to 5000 pound range. The implication was that these cars would be just as cheap, light, low, smooth-riding and quiet with separate frames under them.

The key factor is the extra beef that must be added in the underbracing, especially around the dash area where the body side sills connect to the front side rails that carry the engine and suspension. As the car grows heavier and the wheelbase longer (with constant height) you have to add more "frame" in the body unit to maintain stiffness—this adds to weight and cost. Only in cars weighing less than 2600 pounds can you get the full benefits of true "monocoque" construction, where much of the body's outer surface is stressed. Ford engineers call this the "crossover" point for unit construction economics. In the 2600 to 3200 pound range you can get some of the benefits and future cars in this category will probably have unit bodies. But above 3200 pounds it's a stand-off and the frame body car has certain advantages in easier isolation from road rumble and simpler "tuning" of the body on the frame mountings to damp vibrations.

TRY SCOTCH TAPE

The engineers said one other interesting thing, too: the ultimate potential of uni-

tized construction will not be realized until new methods of joining structural body members have been developed. Adhesives were mentioned as a possibility. It's obvious that classic methods of body welding are on the way out. It's too slow, too expensive and requires too much complex tooling. Researchers are putting a tremendous effort into adhesives. Revolutionary developments are expected within two years. One frame manufacturer is experimenting with adhesives to join crossmembers to the side rails; and some of the new bonding agents have holding strengths up to 10,000 psi!

MAKE SAFETY STANDARD EQUIPMENT

It's good to see our industry getting behind the seat belt movement. It has been decided now to put belt anchor mountings on all 1962 models as standard equipment, so dealer installation of the actual belts on new cars should not run much over $10 per seat. And I was interested in a little booklet on safety belts recently put out by Ford for distribution by dealers and safety groups. The way they tell it crash safety is only one benefit of seat belts. They mention the solid retention in the seat on sharp curves, sudden stops, hard bumps, etc., as important advantages. They even mention the act of buckling the belt as a periodic reminder to drive safely.

CHRYSLER JOY SHORT-LIVED?

There are still a few top executives around the Motor City who don't believe a new compact model in their showrooms is necessarily the quick road to riches. One is Clare Briggs, manager of the Chrysler-Imperial division of the Chrysler Corp. The story has come out now that last year he fought top corporation brass to prevent a luxury compact, along Lancer-Valiant lines, from being attached to the 1961 Chrysler line. A lot of the Chrysler people thought this would catch on. Briggs felt it would only "dilute their image", cheapen the Chrysler name in the eyes of the public and gain no great market penetration. Instead he brought out a new Chrysler Newport line, equivalent to the defunct DeSoto, to sell for less than $3000.

Briggs has some cause to gloat today. Chrysler is one of only three makes to increase sales this year over last year (the other two are Corvair and Thunderbird) — while Briggs watches from afar the flounderings of the new medium compacts from Buick and Olds. Is the man really swimming against the current? Many thought so a year ago. We still think he is. It looks more and more to me as if the optimum package size for the American family car might be an overall length around 190 inches, width between 70 and 75 inches, and height about 55 inches or a bit higher. Weight could be between 2000 and 3000 pounds, depending how much exotic material and construction were used. This would permit lively road performance and excellent gas mileage (20 to 30 mpg) with a relatively small, inexpensive engine, yet there should be plenty of seating and trunk space for family needs.

There is reason to believe that a large body of official opinion holds this sentiment too — as these dimensions are pretty close to the size of the new Ford and Chevrolet "senior compacts" to come out as '62s!

—RH

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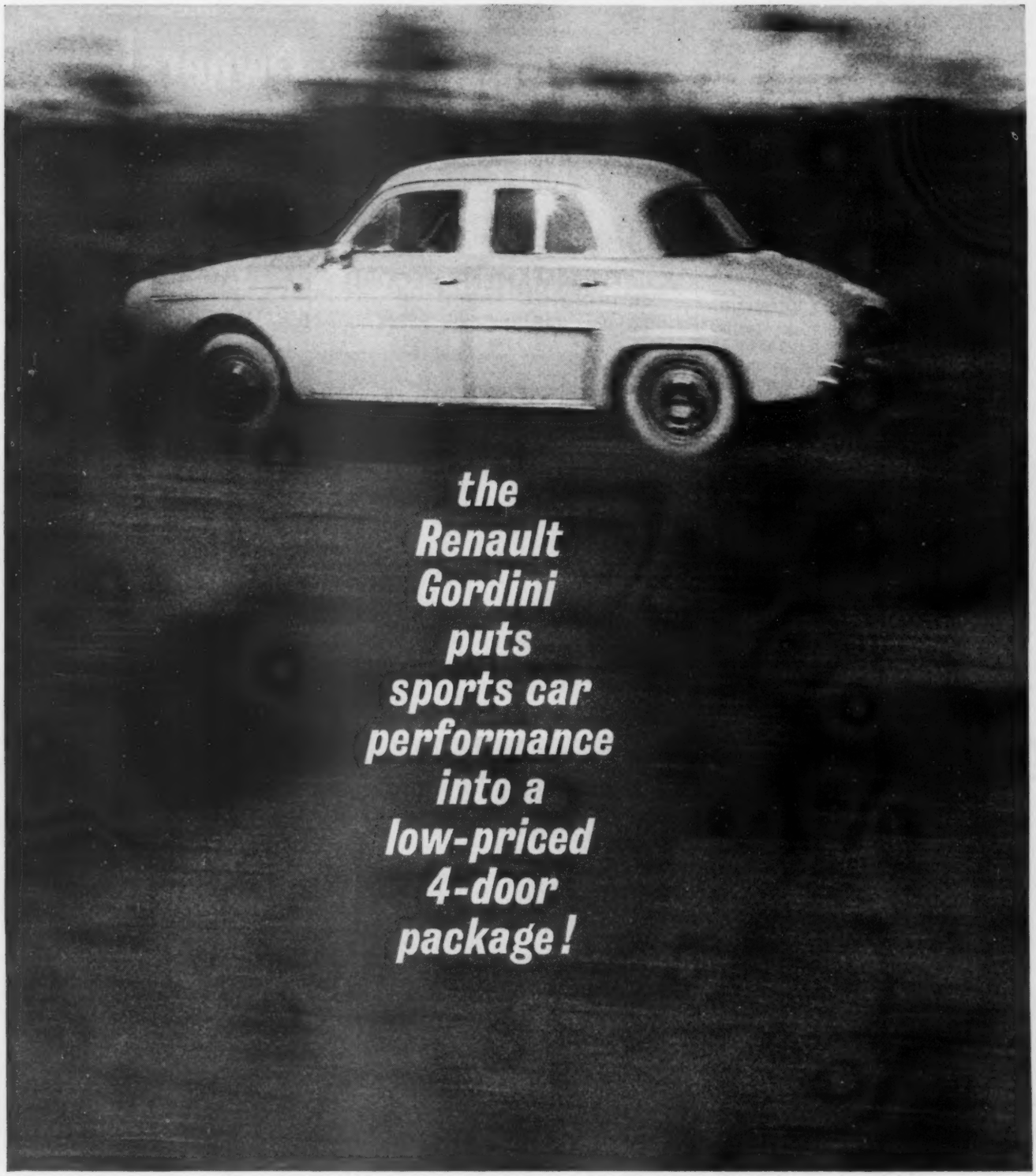

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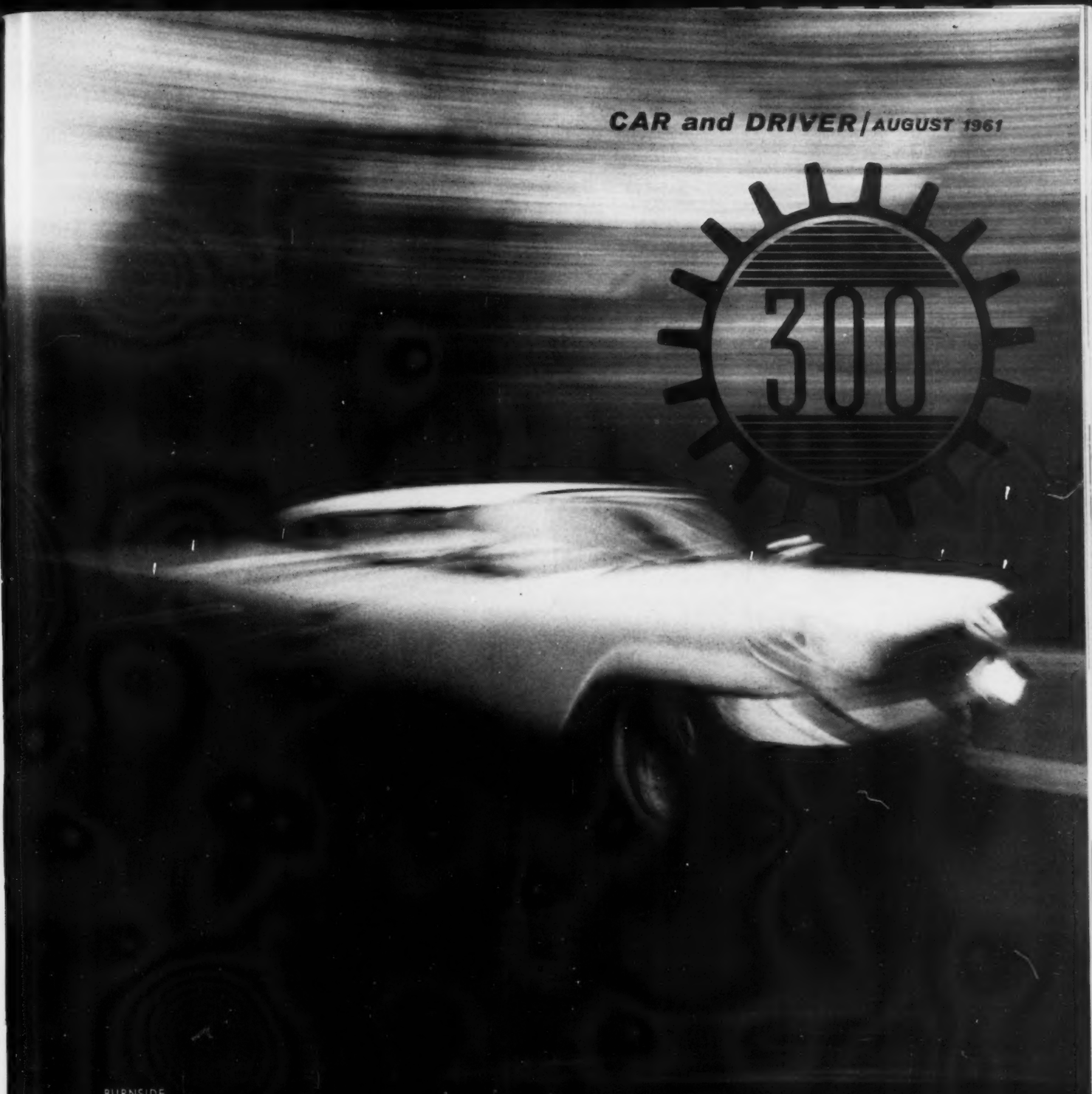
† Except routine maintenance and tires.

*Suggested list price, fully equipped, P.O.E. East and Gulf Coasts.

The Inside Story of The New Renault Gordini: **ENGINE:** 4 cylinder, rear-mounted, water cooled, wet type removable sleeves, overhead valves, oil bath air cleaner, Solex carburetor. Compression ratio 8:1; 40 B.H.P. @5000 rpm; RPM range 1200-5900. **TRANSMISSION:** 4 forward speeds plus reverse (2nd, 3rd, 4th synchronized). Ratios: 1st—3.7; 2nd—2.28; 3rd—1.52; 4th—1.03. Single plate dry type clutch. **SUSPENSION:** Independent 4-wheel coil spring suspension with load levelling atmospheric cushions. Front torsion bar stabilizer. **BRAKES:** Lockheed 4 wheel hydraulic with 9" drums; floating, self-centering shoes. Mechanical hand brake. **PERFORMANCE:** Max. speed in each gear: 4th—79 m.p.h.; 3rd—63 m.p.h.; 2nd—44 m.p.h.; 1st—27 m.p.h. 0-60 m.p.h. in 24 secs. Up to 37 m.p.g. Power to weight ratio: 1:36. **DIMENSIONS:** Length overall 157", width 60".

RENAULT Since 1898
gordini



BURNSIDE

For seven years Chrysler's 300, produced in calculated handfuls, has stood for all that's potent and luxurious in American cars. ■ The background of this Beautiful Brute has been researched in depth by Bill Carroll, with the cooperation of Chrysler Engineering, uncovering a wealth of unpublished information. ■ Beginning here, Part 1 details the four lines of research that led to the 300 concept: Mexican Road Race cars, Exner's experimental prototypes, engines for Indianapolis, and Cunningham's sports cars. ■ Part 2, next month, describes the birth of the 300 and its 300B successor. ■ Part 3, in October, takes you from the 300C through today's 300G and presents a combined table of specifications for all the 300 Chryslers.

BEAUTIFUL BRUTE Part 1

► Chrysler's 300 was blooded one summer day when the bug-eyed Detroit driver of a hot new 1950 Oldsmobile V8 found himself blown off by a sedate gray Chrysler Windsor sedan. He didn't know it, but his Olds was the first of many victims of Chrysler's long-rumored overhead-valve V8. Soon '51s were on the market with Chrysler's power-to-spare from a brand new 331-cubic-inch double-rocker-shaft V8 with 180 horses at 4000 rpm, from a single dual-throat carburetor.

While Chrysler engineers were hot-rodding Windsors to shatter Olds owners, wealthy sportsman Briggs Swift Cunningham was testing a Cadillac sedan and a special-bodied Cadillac around Le Mans. European reporters dubbed Briggs's special "The Monster" because the roadster's mammoth hood seemed more suitable for warfare than racing. Cunningham's first special entry in France's 24-hour classic finished 11th, the sedan 10th.

Beaten but eager to try again, Cunningham returned to the United States and a preview of Chrysler's V8, a powerplant he thought could win Le Mans. The result was a team of Chrysler-powered roadsters for the 1951 race. These were the famous C-2 models made from Chrysler, Oldsmobile, Cadillac and Dodge Truck parts. They were on a 100-inch-wheelbase chassis, with four-carburetor 331-cubic-inch Fire-Power V8s. Coil springs were used all around, with a de Dion rear axle.

One car spun and was wrecked. Another had mechanical trouble. The third ran out of main and connecting rod bearings, but finished 18th. Their fault was weight for at 3400 pounds dry, a C-2 weighed 700 pounds more than its heaviest competitor. According to Cunningham, cost of four C-2s (three for racing — one for training) was $100,000. All wore the checkered flag Cunningham trademark, later picked by Chrysler for identification of the first Chrysler 300s.

A third chapter of the 300 story was being formed in Italy where, in 1951, famous body-builder Ghia was designing a beautiful new coupe with Virgil Exner, chief stylist of the Chrysler corporation.

The two-tone blue Exner-Ghia was still under construction when Cunningham, back from his 18th place at Le Mans, began needling Chrysler's engineering department for more horsepower. Engine specialists put a Fire-Power V8 on the research dynamometer and cranked out 310 horsepower using four single carburetors on a double-runner manifold, and a 260-degree-duration cam.

Shortly afterward, Chrysler Corporation scheduled an engineering show in New York. Sales promotion men had a production Fire-Power engine painted and chromed to simulate the engine that actually produced 310 horsepower. It was "married" to the recently arrived Exner-Ghia coupe, as the K-310 engine and car. Displayed at the show, it was Chrysler's first high-style coupe with a performance message. However, despite reports to the contrary, the K-310 coupe never rolled an inch with the 310-horsepower engine in it.

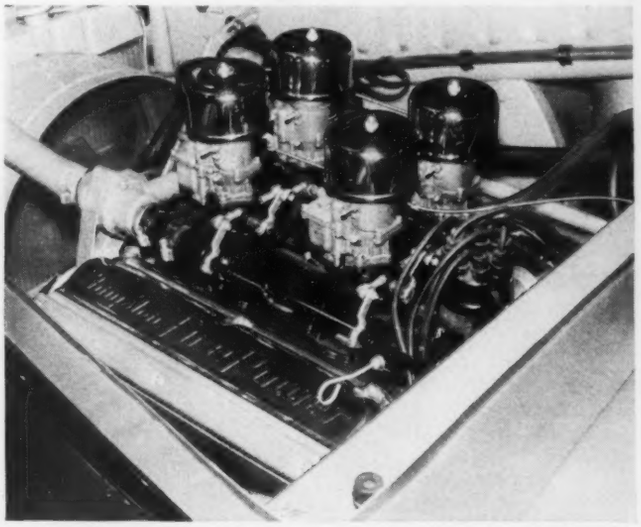
In June of 1952 Briggs Cunningham appeared at Le Mans with his Chrysler-powered C-4R models: two roadsters and a coupe. They were 600 pounds lighter than the 1951 cars, and had 300-horsepower V8s under the hood. Cunningham engineer Briggs Weaver designed a beautiful five-speed box to match the engine. Two were built but a minor lubrication fault sidelined them in practice in favor of 3-speed Cadillac boxes. Downshifting from high speeds with only three cogs led to over-revving and valve gear problems that retired the cars. A Mercedes-Benz won, averaging 96.67 mph. A Cunningham roadster, which Briggs drove 18 hours without relief, finished fourth, averaging 87.15 mph. The coupe retired after skidding into a sand pile with valve trouble and the other roadster swallowed a valve after running fifth for four hours.

One Le Mans rule was that all cars entered must be production prototypes, which forced Cunningham to make and sell at least ten cars to qualify entry of his Chrysler-powered bombs. Prices quoted by Cunnningham in 1952 were: Sedan $9,000; Convertible, $10,000; Race cars, $15,000.

A fourth section of the 300 story was quietly gathering steam in Chrysler engineering laboratories as an offshoot of Cunningham and K-310 activity. This was a group of four V8s built for the 1953 Indianapolis race. Chrysler carried its 310-horsepower experiment a step farther with Hilborn injection and extensive internal changes, producing 400 bhp from the stock displacement. In the fall of '52 this brute was bolted into Murrell Belanger's Kurtis chassis and tested at the Brickyard by Joe Sostillio. It averaged better than 135 mph for 140 miles and ran a total of 900 test miles without even a change of spark plugs.

The above performance made the stock-displacement Chrysler a strong Indy contender but by no means a certain winner. Nevertheless, a preliminary decision to allow 331-inch stock-based engines in the race was withdrawn in December, 1952, to protect the investment of car owners in Meyer-Drake engines. Belanger and Chrysler didn't give up. In the time remaining they prepared four engines with strokes reduced to bring displacement down to 271 cubic inches. These developed 372 bhp at 5800 rpm on methanol, an impressive peak figure, but they no longer had the mid-range punch that Indy requires and none of the engines made the starting line.

These engines plus two cars were sold to the Firestone Tire and Rubber Company for their well-known racing tire experiments. One V8 ran a whole season of 160-170 mph testing without need for mechanical attention. Though Firestone has since changed over to (*Continued overleaf*)



Production Cunninghams, with Vignale bodies, used the Chrysler Firepower engine equipped with a special log-type manifold with four carburetors.

Virgil Exner's Ghia-built K-310 had styling details later used on the Imperial, but a smooth basic shape that inspired the first 300's lines.

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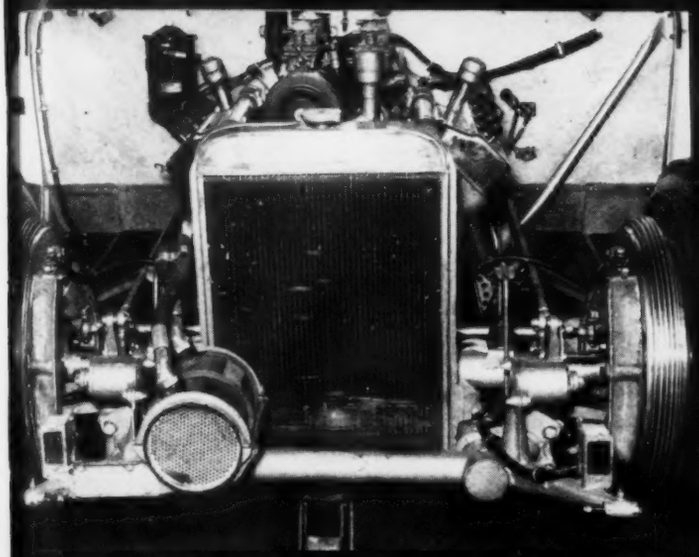


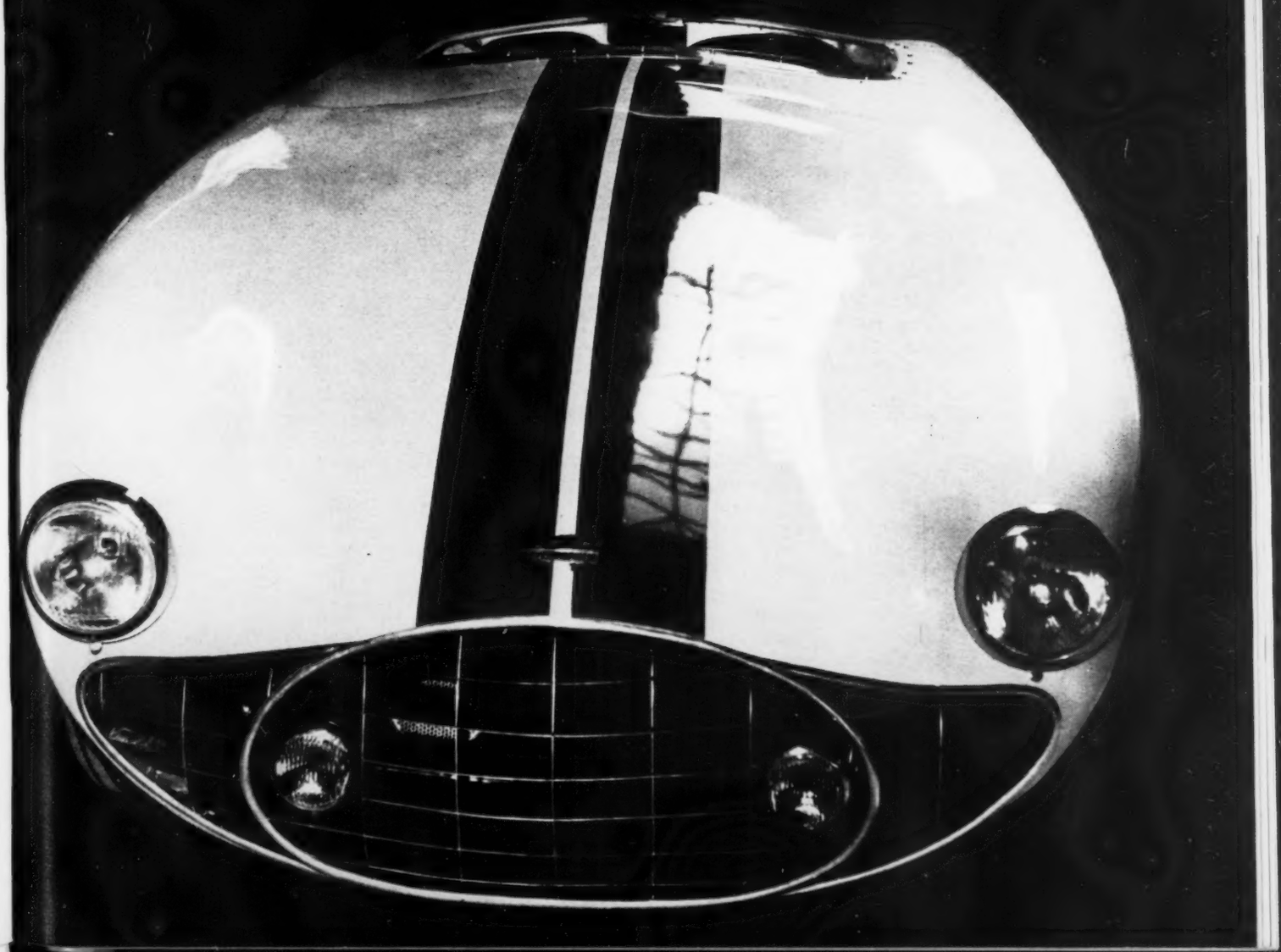
MAILANDER

Uncovered front end of C-5R Cunningham reveals gigantic 17-inch brakes, the cylindrical aircraft-type oil cooler ahead of radiator, and the intricate detailing of the big-tube frame and the Houdaille-damped solid front axle.

RUBIN

First appearance of C-4R Cunningham was in 1952 at Bridgehampton, where Phil Walters led the field easily before an exhaust pipe broke. Special wheels were then used with cast-in centrifugal cooling vents for brakes.

Typical Cunningham egg-crate grille, as on C-5R below, has bold feel that inspired original Chrysler 300 styling studies as author shows next month.



Pontiac power (SCI, April, 1960) it still owns these very special engines.

A Chrysler engineer recently told CAR AND DRIVER, "The Indianapolis project's contribution to our knowledge of performance was immeasurable. Without such experimental race engines, we couldn't have been successful with the Chrysler 300 package. As to ram induction, this is where we learned to do it."

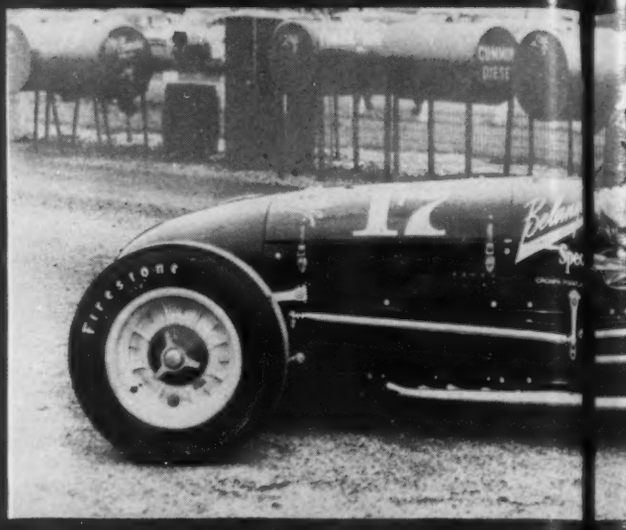
By 1953, Chrysler was deep in correspondence with auto enthusiasts who found the Fire-Power V8 a storehouse of performance. Cunningham's efforts at Le Mans and the Indianapolis specials whetted the hot-rodder's appetite for maximum performance. A Chrysler-powered Bonneville streamliner ran 235.991 mph. Third place in the 1952 Mexican Road Race was nailed by a Chrysler that came in only 16 minutes after the winning Ferrari. These combined pressures led to the last-minute announcement of an extra-cost "Heavy Duty" engine and suspension package, which Chrysler engineers hoped would be a winner in the 1953 Mexican Road Race. The package included an engine of increased compression ratio, roller tappets on a wild cam of fantastic duration and a dual-quad manifold. Underneath the chassis were "Air-Lift" suspension stiffeners, stabilizer bars front and rear, disc brakes borrowed from the Imperial and extra-duty axles.

During the third Mexican Road Race Chrysler Division's chief engineer, Bob Rodger, went to Mexico as an observer. As Bob remembers it, "From 1950 to 1953, there was a lot of interest in the Mexican Road Race. Though we didn't win, we learned a lot about suspension and handling we could never have discovered any other way. We shifted to Imperial wheels because they were stronger and wire spokes let brakes cool faster. Mexican cars had export springs and shocks, plus Imperial front suspension, front axle stubs and rear axle shafts. We placed fifth in the stock car class, 28 minutes behind the winning Lincoln."

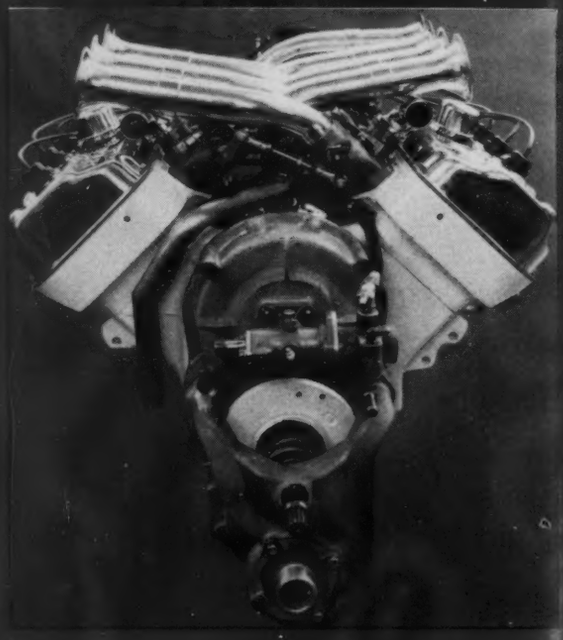
While Chrysler was building its Indianapolis engines and working to produce a winning Mexican Road Race car, Briggs Cunningham was preparing his new 2600-pound C-5R roadster for the 1953 Le Mans event. The new Cunningham-Chrysler V8 used roller tappets, sweeping headers, larger valves (due to appear later in the 1957 300C), and 7.5 to one compression ratio to produce 310 horsepower on the 80-octane gas used at Le Mans. (This Cunningham engine obviously was closely related to the 331-inch Indy powerplant: close liason was maintained with Chrysler through a Mr. Butterfield there.—Ed.)

The C-5R chassis was unusual in having solid axles both front and rear. This idea came from Phil Walters, who felt it would suit the smooth surface of Le Mans, and was executed by Briggs Weaver. The simple tube frame was torsion-bar-sprung to the axles, which were located by long parallel radius rods. This layout worked well in the race, where the C-5R handled well and, unlike its team-mates, required no tire changes. Other C-5R features included an Italian Siata four-speed gearbox and gigantic 17-inch brakes which were sufficient in size but deficient in design because the beautiful cast aluminum shoes wouldn't adapt themselves to changes in the drum contour. Nevertheless they had Ferrari-like parallel action and fully automatic adjustment.

Backing the C-5R were two improved 1952 Cunningham C-4Rs. Spare parts included 36 mounted tires, 16 brake drums, three transmissions, two complete engines, 1500 spark plugs and 24 rolls of toilet paper. The C-5R, driven by Fitch and Walters, finished third, only six laps behind the winning Jaguar. Seventh place in 1953 was taken by Cunningham and Spear, driving the revitalized 1952 C-4R roadster. Moran and Benett, driving the C-4R coupe, came in tenth. Average speed of Cunningham's C-5R was 104.14 mph, to the winning Jaguar's record 105.85, for 24 hours! (*Continued on page 70*)

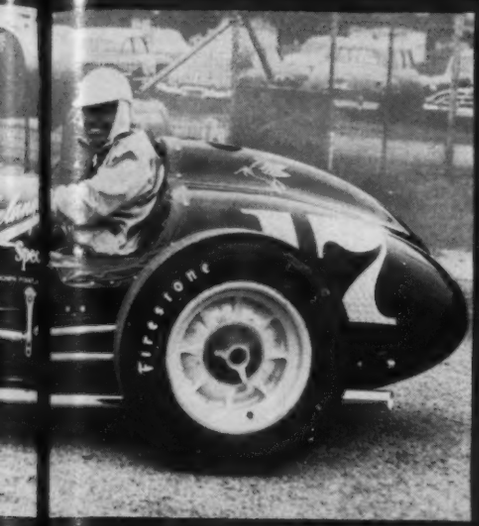


Chrysler V8 as it appeared at Indy in the lightweight Kurtis chassis. Year was fitted to Kurtis "quad-tor" chassis for Firestone tests.

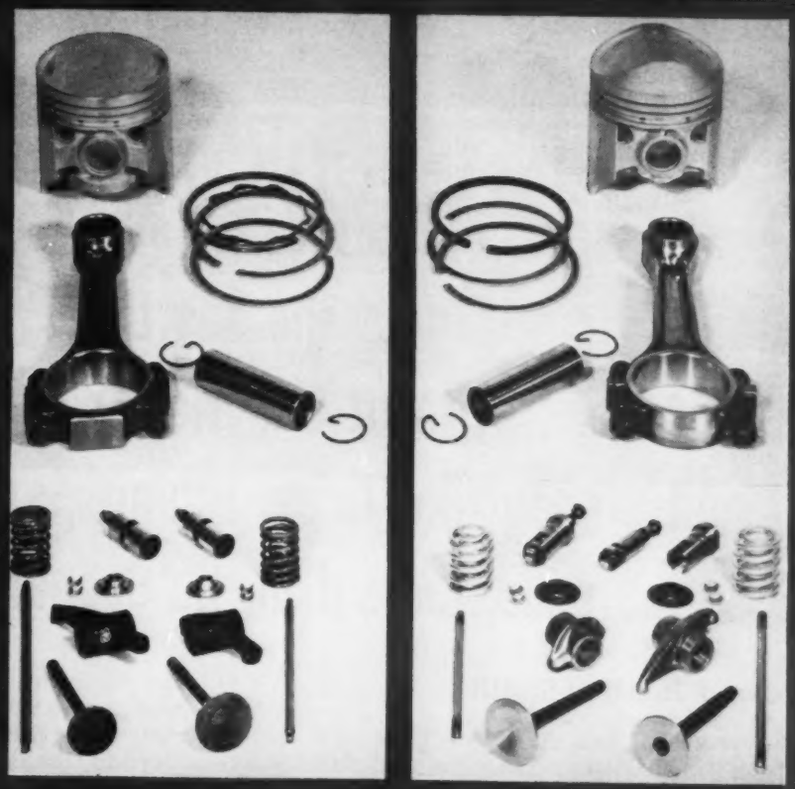


Front of engine shows water pump at bottom, splined shaft for [illegible] and Hilborn injection pump driven from camshaft nose.

SPECIFICATIONS: CHRYSLER INDIANAPOLIS RACING ENGINES

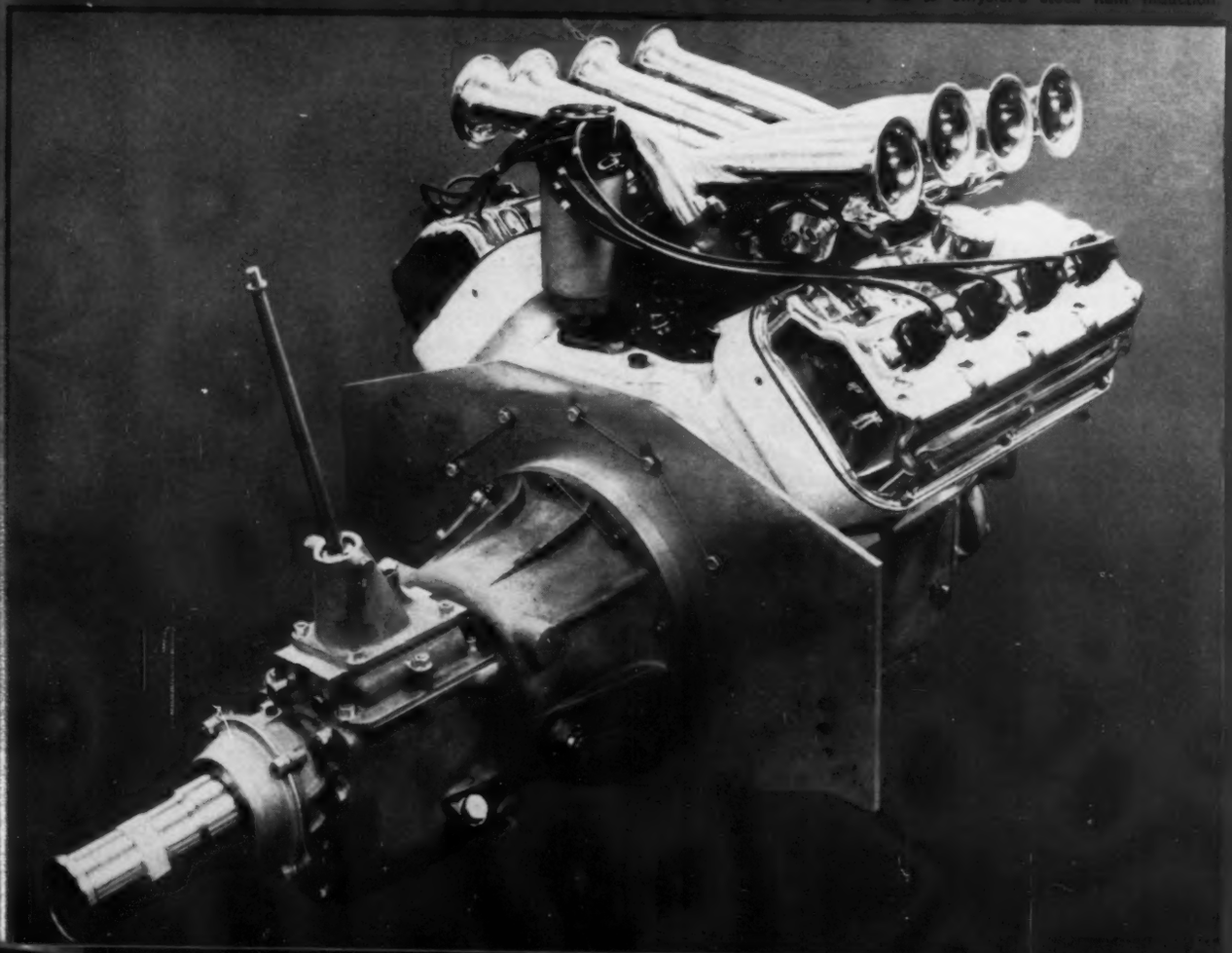


DETAILING THE INDY CHRYSLERS



Comparison between production and racing parts is graphic. Racing engine has high-domed piston, roller tappets, larger valves and special forged rockers for redesigned valve gear.

Rear view of the potent four-eight shows multiple-disc clutch and two-speed box, both made for Indy use by Meyer-Drake. The vertical Vortex magneto replaces original distributor. Long, flared ram pipes, mated to Hilborn injection, ultimately led to Chrysler's stock Ram Induction.



DON'T-DO-IT-YOURSELF RACERS

Without Cooper and Lotus, Britain wouldn't lead in Grand Prix racing as she has through 1960. On the other hand, without a myriad makers of vital bits and pieces like tires, tubing, tachometers and tie rod ends, there'd be no Cooper or Lotus!

by Richard Bensted-Smith

► "Ford Vanadium," said the Model T catalogue half a century ago, "is Ford Steel. Vanadium steel, scientifically heat-treated, has made it possible for the Ford Motor Company to build a car extra light in weight and yet tremendously strong." This piece of publicity is gratuitous and we anticipate no reward from Dearborn. It merely illustrates one of two ways you can go about building an automobile. Henry's breathtakingly simple way was to buy his own Vanadium mine. The way of men like Colin Chapman and John Cooper, who have just the same ideas on strength and weight-saving but make about as many cars per year as the Ford Motor Company has vice-presidents, is to screw together the pieces provided by a couple of dozen fairy godmothers called Dunlop, Ferodo, Vandervell and so on. There are, we'll allow, several methods of screwing things together; some work better than others and in consequence win races. Exactly why they do is a problem which no doubt exercises the minds of Chapman and Cooper (as well as Berthon and Nichols), because this year, more even than before, the British Formula 1 contingent will be a lot of different arrangements of the same bits.

The merit or otherwise of buying-out depends largely on why you go racing. Assuming the Number One reason is that you want to win, Number Two is probably to make money, either by selling racing cars or by attracting enough publicity to sell some other product – passenger cars in the case of Porsche, Mercedes and to some extent Lotus; industrial goods generally in the case of B.R.M. Either way, you try to relate what you race to what you sell (we're talking of manufacturers, before anyone asks which part of a racing car looks like a Yeoman Credit Easy Payment). It's been proved that race-winning brings engineering prestige that will sell a Rubery Owen washing machine or die-casting, so the more of the B.R.M. is built by the Owen Organisation the better. The same, more directly, goes for Porsche, whereas Cooper and Lotus have never sold anything but cars with proprietary engines.

The engine, naturally, is the biggest bought-out bit, and there's good reason for having it this way. For the first months of the new formula even B.R.M. will be joining the Coventry Climax queue along with Lotus, Cooper, Elva, Emeryson and anyone else who feels like having a go and can pay for it. They won't, maybe, have a winner to start with, in the face of the 190 galloping Modena horses currently being claimed for Enzo Ferrari's wide-angle V6. What they will have is a cheap, reliable and familiar four-cylinder device of which Coventry Climax built between two and three hundred over the past three years. Since Lotus, for example, made about a hundred single-seaters in 1960 but only a couple of dozen of them for Formula 1 and 2, this makes sense both in hard cash and in picking out the bugs.

The twin-cam Climax is *not* an enlarged, tuned firepump engine. It began as a completely new 1475 cc design in 1957, when the original firepump unit had been stretched by 440 cc and 65 bhp and it was clear that single cams were going to be *démodé* for the coming Formula 2. It is nevertheless a sidekick of an old and respected name in industry, which builds machinery like fork-lift trucks and generating sets. Coventry Climax has far bigger resources of money and engine know-how than anyone building cars on the Cooper-Lotus scale. Because they are in the business for the sake of their bank balance (and the good of their own name) they have perhaps concentrated on making engines that keep going, rather than going like a bomb; conversely, though there is certainly a longer string of O's in the bank after Alfred Owen's name, the sheer number of Climax engines about the place is worth a lot in development experience.

The mention of money raises an interesting point. Lotus personnel, when we went to see them, were laughing heartily at an article in an English magazine suggesting that whereas Porsche racing development had to be paid for out of the firm's meager sale of 6000 or 7000 cars a year, the British racing car manufacturers had a powerful subsidy from their national industry. It's quite true that if your name is Chapman or Cooper you won't pay much for spark plugs – possibly even the other way around – but with the exception of a few items from people like the oil companies who impartially support the works teams of Britain, Germany or any other country, the racing car boys do not go shopping with Monopoly bills. The terms for other peoples' research are strictly cash; another universal provider to the British cars is Joseph Lucas Ltd., which makes a fine four-cylinder magneto – at around $150 each.

The Lucas mag. is standard equipment on the Climax engine as used by Cooper, Lotus, Elva and others, as well as on the 2½-liter B.R.M. It's worth recalling, perhaps,

that when the V16 B.R.M. project was formulated as a joint enterprise by British industry in 1947, two of its most powerful supporters (*with* hard cash) were Alfred Owen and Bernard Scott, then boss of the Lucas concern. Another piece of Lucas gear which is going to cover a lot of miles in 1961 is the electric starter now ordained by the F.I.A. Like the magneto it is the universal choice, which is hardly surprising since very few cars in Britain are started by anybody else. At the time of writing it is not clear whether Lucas will provide the necessary battery for everyone, too. B.R.M. and Cooper certainly have it. Lotus when last seen was in process of trying to convince Lucas that its 26-ampere-hour battery was better than it (Lucas) thought. Having been told that the capacity was adequate for only two starts the Lotus men used a Varley aircraft battery of similar size for a day's testing, and not only started 11 times but had one more from cold the following morning.

Other names were associated. (*Continued on page 68*)

		COOPER	LOTUS	B.R.M.	ELVA
1	Engine	Coventry Climax	Coventry Climax	Coventry Climax	Coventry Climax
2	Radiator	Serck	Serck	Lawrence	Serck
3	Water hose	John Bull	all makes	Spencer Moulton	all makes
4	Carburetors	Weber	Weber	Weber	Weber
5	Fuel pump	Chandler Evans	Chandler Evans	Plessey	Plessey
6	Fuel pipes	plastic tube	plastic tube	Aeroquip	plastic tube
7	Fuel filter	Vokes	AC	Vokes	AC
8	Fuel tank	Cooper	Lotus	Fireproof Tanks Ltd.	Elva
9	Oil pump	Coventry Climax	Coventry Climax	B.R.M./Climax	Coventry Climax
10	Oil pipes	Oil Feed Engineering	Oil Feed Engineering	B.R.M./Aeroquip	Oil Feed Enginering
11	Oil cooler	Serck	Serck	Delaney Gallay/Lawrence	Serck
12	Oil filter	Tecalemit	Purolator	Purolator	Tecalemit
13	Spark plugs	Lodge	Champion	KLG	Champion
14	Magnetos	Lucas	Lucas	Lucas	Lucas
15	Starter	Lucas	Lucas	Lucas	Lucas
16	Battery	Lucas	Lucas/Varley	Lucas	Lucas
17	Instruments	Smiths	Smiths	Smiths	Smiths
18	Gearbox	Cooper	Colotti/Lotus	B.R.M.	Elva
19	Clutch	Borg & Beck	Borg & Beck	Borg & Beck	Borg & Beck
20	Clutch facings	Ferodo	Ferodo	Ferodo	Ferodo
21	Final drive	Cooper/ZF	Lotus/ZF	B.R.M.	ZF/Elva
22	Drive shafts	Hardy Spicer	Hardy Spicer	B.R.M.	Hardy Spicer
23	Universals	Hardy Spicer	Hardy Spicer	B.R.M.	Hardy Spicer
24	Suspension joints	Cooper/Thompson	Thompson/Heim/Metalastik/ Silentbloc/H. Clayton-Wright	B.R.M.	Thompson/Heim
25	Tie rod ends	Thompson	Thompson	B.R.M.	Thompson
26	Front suspension posts	Cooper	Alford & Alder	B.R.M.	Alford & Alder
27	Springs	Terry	Armstrong units	Jonas Woodhead	Armstrong units
28	Shock absorbers	Armstrong	Armstrong units	Armstrong	Armstrong units
29	Hub bearings	Timken/Ransome & Marles	Timken/Fischer/Skefco	Hoffmann	Skefco
30	Brakes	Girling	Girling	Dunlop	Girling
31	Brake pads	Mintex	Ferodo	Mintex	Ferodo
32	Wheels	Cooper	Lotus	Dunlop	Elva
33	Tires	Dunlop	Dunlop	Dunlop	Dunlop
34	Steering wheels	Cooper	Derrington	B.R.M.	Derrington
35	Driving mirrors	Radyot	Leston	Stadium	Derrington
36	Seats	Cooper	Lotus	B.R.M./Dunlopillo	Elva
37	Fuel and oil	Esso	Esso	Shell	not yet signed

Sicilian Spectacle *by Peter Coltrin*

Ancient, embattled Sicily cheers as Ferrari repels Porsche and Cooper invaders.

• Just as some counties and states are considered "weathervanes" to results in national elections, some observers feel "as Syracuse goes, so goes the season." It is, of course, an oversimplification, but results in the first major Grand Prix of the season could indicate a Ferrari sweep in 1961 and the renaissance of Italian drivers winning in the blood-red cars.

The hint of things to come suggested by the April 25 Syracuse G.P. received further emphasis five days later when the action shifted northwest across Sicily to the Palermo area for the Targa Florio. Again Ferrari claimed an outright win, but this, like the one at Syracuse, saw Porsche threatening all the way. The 3.4-mile Syracuse circuit consists mainly of high-speed bends with one hairpin and two 90-degree turns. Stirling Moss set the lap record in a Vanwall in 1957, clocking 1:54.3 (107.41 mph), a time nearly equaled by Dan Gurney this year.

The XI *Gran Premio Siracusa* was held on Tuesday, April 25, a Sicilian holiday commemorating the World War II Allied landings. The first practice session was held on Sunday and lacked any English participation since most of the cars and all of the drivers were enroute from England, having participated in the race at Aintree the day

before. Scuderia Centro Sud was represented with two Cooper-Maseratis for Bandini and Natili, two young Italians emerging from the Formula Junior and sports car ranks respectively. Bandini's car was fitted with a Colotti gearbox and had coil springs all around while Natili's Cooper had a Cooper gearbox and leaf springs at the rear.

Equipe Nationale Belge had two Emeryson-Maseratis for Gendebien and Mairesse. These also used the Colotti gearbox-differential units. Gurney and Joe Bonnier were representing Stuttgart with what were essentially the 1960 F.2 Porsches. The Cooper-Climax of Maurice Trintignant was there, entered by Scuderia Serenissima. During the winter, Colotti made some changes on this car's front suspension and his gearbox is used here also, but a leaf spring is retained at the rear. It's the former Rob Walker car.

The rest of Sunday's practicers consisted of private entries, including Seidel with a Lotus-Climax, except for the F.I.S.A.-entered, factory-maintained and supervised Ferrari. F.I.S.A. (*Federazione Italiana Scuderie Automobilistiche*) is comprised of the major Italian racing teams in conjunction with the Italian Auto Club. Its purpose is to find and promote Italian driving talent and toward this end Ferrari has put at its disposal, for Italian events, a F.1 car for this season. As its first candidate, F.I.S.A. selected 25-year-old Giancarlo Baghetti from Milan, a successful Formula Junior driver last season in a Dagrada who drove briefly with Mairesse at Sebring this year. Syracuse was to be his first outing on a F.1 car. His Ferrari was last year's car still fitted with the 65° V6 engine. Ferrari himself had entered a F.1/61-120° with Richie Ginther to drive it, but at the last moment the car was withdrawn due to oil pressure problems (since solved).

At the end of Sunday's practice, "new boy" Baghetti had put in the fastest lap — 1:58.8 — equaling Moss's 1960 Formula 2 record. Dan Gurney, who really had to extend himself, was second fastest with a 2:00.1, followed by Gendebien and Bonnier. Everyone was impressed with the Ferrari's performance but many observers felt that the arrival of the English "aces" the following day would change the picture and that Baghetti would find the going considerably tougher.

Ready for the second day's qualifying were Moss, Ireland and Clark with Lotuses. Brooks and Graham Hill were present with their B.R.M.-Climaxes. Brabham had a new 1960-type Cooper-Climax as did Yeoman Credit with cars for Salvadori and Surtees. The latter's car had a special body, being sleeker and seemingly more aerodynamic; it also sounded and performed the best of the Coopers. Toward the end of practice Baghetti again set the pace with a lap at 1:57.0 which was just beaten by Gurney with 1:56.9. These two shared the front row with Surtees (1:57.8). The second row was comprised of Graham Hill, Brabham and Bonnier while Moss had to settle for the third row along with Salvadori and Ireland.

Nineteen cars started the race. At the drop of the flag Surtees burst into the lead, followed closely by Gurney and Bonnier. At the hairpin Baghetti, who was in the middle of the howling pack of pursuers, got sideways but recovered in time. Continuing the chase, he began picking off the front-runners one by one. By the sixth lap he had passed Surtees who was second to Gurney and then passed the Porsche into the lead. Surtees was out on the ninth lap with a broken fuel pump and Bonnier was third. Gradually the three front-runners began to separate themselves from the rest of the field. Brooks, whose B.R.M. had never seemed to run properly, blew up on the 90-degree turn prior to the pit straight. Brabham and Moss, their engines sounding ragged, faded out of contention although Ireland, who had been going well, went out with a bang when he struck a hay bale and bent the front suspension.

Giancarlo Baghetti, 25, won his first G.P. at Syracuse driving a Ferrari under the auspices of FISA, a group to aid new Italian drivers' careers.

Though outpowered by the Ferrari, Gurney never let up the pressure, waiting for Baghetti to make a mistake. To the young Italian's credit he drove (*Continued on page 74*)

45th Targa Florio

April 30, 1961

Ten laps, 45 miles per lap

(first ten finishers only)

1	von Trips/Gendebien	Ferrari	6:57:39 (64.13 mph)
2	Bonnier/Gurney	Porsche	7:02:03
3	Herrmann/Barth	Porsche	7:04:14
4	Vaccarella/Trintignant	Maserati	7:28:49
5	Maglioli/Scarlatti	Maserati	7:40:04
6	Pucci/Linge/Strahle	Porsche	7:48:25
7	Hanstein/Linge/Strahle	Porsche	7:50:53
8	Rosinsky/Costen	Alfa Romeo	7:59:08
9	Coco/"Sand"	Alfa Romeo	8:06:14
10	"Kim"/"Tom"	Alfa Romeo	8:06:48

Fastest Lap

von Trips (Ferrari) 40:03.4 (67.5 mph)

XI Syracuse Grand Prix

April 25, 1961

56 laps, 3.4 miles per lap

1	Baghetti	Ferrari	1:50:08.2 (104.03 mph)
2	Gurney	Porsche	1:50:13.2
3	Bonnier	Porsche	1 lap behind
4	Brabham	Cooper-Climax	1 lap behind
5	Salvadori	Cooper-Climax	2 laps behind
6	Bandini	Cooper-Maserati	3 laps behind
7	Clark	Lotus-Climax	3 laps behind
8	Moss	Lotus-Climax	4 laps behind
9	Seidel	Lotus-Climax	7 laps behind
10	Boffa	Cooper-Climax	7 laps behind
11	Mairesse	Emeryson-Maserati	14 laps behind
12	Pirocchi	Cooper-Climax	19 laps behind

Fastest Lap

Gurney (Porsche) 1:54.9, (106.84 mph)

Graham Hill pushed his car over the finish line, apparently finishing 7th, but officials missed it and listed him retired on 53rd lap.

Joe Bonnier wraps the two-liter Porsche RS through the mountains of the Targa Florio as he and teammate Dan Gurney pressed the Trips/Gendebien Ferrari. Brand new, even in style, it was unpainted.

Moss drove the Camoradi 1978 cc Porsche within four miles of possible victory only to have its rear end fail as he resisted Trips's onslaught.

Most of the faces in the crowd seem to express doubt whether the Type 63 Maserati is una bella machina. It's using both Borrani and Dunlop (rear) wheels as Maglioli whips it through a corner.

Surtees's Yeoman Credit Cooper appeared sleeker than the rest of its clan. It also sounded better and went well enough to get John a front-row starting position only to be eliminated with fuel pump trouble.

Try this in your home town! The gentlemen on the corner look only mildly concerned as the Vaccarella Maser practices in Campofelice for the Targa, one of the last genuine road races.

SERVICE WITH A SMIRK

by James Coyle

That ill-kempt teenager who is smearing your windshield didn't come by his technique naturally. Where did he learn his stuff? For an answer park over by the air hose and read the following inside story on a school for slobs.

■ "Oops!" the station attendant said, spilling a half-gallon of gas as he watched an attractive slack-clad pair of buttocks pass down the street. "Gotta be psychic to tell when this tank's full."

"It's only Ethyl," I said. "At 40.9 a gallon."

Once more I marveled at the art that enables a service station attendant to misjudge the capacity of your gas tank consistently, forget to replace your radiator cap and unfailingly leave oily handprints on your fender after an engine check. Where does he acquire these skills?

My quest to find an answer led me a week later to the Behemoth Oil Company's Advanced School For Station Management. There, in his oak-paneled office overlooking the quad, I talked to the school's dean, Dr. T. C. P. Tailpipe.

"You're in luck," Dr. Tailpipe said, shaking my hand warmly. "A new class starts today."

I wiped off a deposit of grease left on my palm by the doctor's handshake and asked, "What are your entrance requirements, sir? Or is a candidate recommended by his Congressman?"

"Not exactly," the doctor said, stroking his vandyke thoughtfully. "We eliminate the obvious misfits by written examination; an I.Q. of 75 or over automatically disqualifies a man. We also investigate reading habits. An habitual comic book reader, for example, is a good bet."

"That figures," I said. "What is the first thing the student learns?"

"How to grease himself." Dr. Tailpipe rose and went to the window. "There's our freshman class," he said, pointing to a group of youths clad in Behemoth's distinctive white coveralls. Lined up before a large barrel labeled "Grease," each man in turn carefully smeared the goo over his hands, elbows and the seat of his pants. "Now you see why your upholstery is covered with grease after a simple lube job."

"What stumps me," I said, "is why my windshield is always dirtier after cleaning than before."

"I'll show you," the dean said, picking up his Doctor of Motors hat. "Let's visit some classes."

We strolled across the campus until we reached an installation which duplicated exactly the mammoth jukebox appearance of a large modern service station. A car was drawn up at one of the islands and a group of students clustered around an instructor who held a spray bottle and paper towel. "Windshield Tactics I," Dr. Tailpipe whispered to me. "Listen."

"Messing up a windshield isn't as easy as you might think," the instructor was saying. "The mixture of cigarette ashes and dirty dishwater used in the spray

bottle helps. So does the abrasive compound in the towel. Mainly, though, it takes study, application, plain old hard work . . ."

"This group's next subject will be Filling the Tank," the doctor said as we moved away. "The trick is to spill enough gas to boost your gallonage but not enough to earn a paste in the eye from the customer."

At another island a group was assembled about a car with the hood up. The instructor was demonstrating how to check the oil level.

"Note," he said, "that I remove the stick, wipe it off in such a way as to leave a gob of oil on the fender, then return the stick. I remind you that demerits are incurred for wiping the oil off the fender."

"Later in the course," Dr. Tailpipe explained, "the student learns the art of leaving off the radiator cap without detection by the customer. Due to the exposed position of the radiator, this requires more skill than leaving off battery caps. Indeed, you might say it separates the men from the boys."

We next entered a large building labeled "School of Lubrication and Tuneup." The doctor introduced me to the dean, Professor Griesenick.

"Emphasis here is on the Plus Sale," the professor said. As he talked he toyed with a grease gun, idly tracing a dollar sign on the back seat of an open convertible. "For example, the student learns to replace all engine oil, oil filters and spark plugs at the drop of a hat, regardless of their age or condition." He winked. "Unless, of course, the customer thinks to instruct him otherwise."

"Sly dog, Griesenick," Dr. Tailpipe said with a laugh. "You forgot to mention that students are also taught to suggest a major tuneup every 500 miles."

"I get one every six months," I said.

"I get one every two years," Dr. Tailpipe said. "We were talking about the customer."

Once more out on the campus, we passed a mockup of a row of station restrooms. Students were practicing locking the doors.

"In our course on Restroom Procedures," the doctor said, "we place utmost importance on the locked-door policy. It cuts down tremendously on restroom traffic, and thus on the cost of maintenance and supplies, if the customer has to ask for a key."

"I see," I said. "Hey, over there, look out!"

Out of the corner of my eye I had been watching a group of students gathered in a parking area a short distance away. Now a gray-haired man with pince-nez was in the act of backing a Cadillac sedan at high speed into a space that hardly seemed wide enough for a Volkswagen. There was a crunching sound, but the Caddie squeezed in. The students cheered.

"That's Professor Gearstrip," Dr. Tailpipe said. "Terrific, isn't he?"

"What does he teach?" I asked.

"He occupies our Chair of Fender-bending. A most important skill if a station has parking facilities. And a real money-maker if you have a body-and-fender shop in connection."

We were again passing the model station and I noticed a student cleaning the windshield of a Chrysler Imperial while he chatted gaily with the driver, a beautiful blonde. On the other side of the island sat a man in an old-model Ford, glaring impatiently at the tête a tête.

"A student in our graduate school," Dr. Tailpipe said. "Doing research for his Master's."

"What do you suppose his subject is?"

"Something like Aspects of Keeping the Customer Waiting. There's an art to judging just how long you can keep a customer dangling before he gets mad and drives off. As you can see, this man is almost at the breaking point."

ILLUSTRATIONS: MARVIN GLASS

Back in the doctor's office after our tour I asked if many of the students washed out.

"A few, unfortunately." The doctor lit a cigarette and looked thoughtful. "Due mainly to a lack of moral fiber."

"How's that?"

"Take this young chap we had to let go last week—big man on campus too. He couldn't learn to add up a bill to come out with a slight overage in the company's favor. Said he just didn't like the idea."

"Tsk, tsk."

"Others just aren't built to assimilate higher education. Only this morning I had a report on a student who was doing well in most of his subjects. But he couldn't pick up the knack of quietly cutting a fan belt or ripping a wiper blade as a means of upping accessory sales. Sad, really."

I rose to go. "Thank you, Doctor," I said. "I'll certainly remember what I've seen here today."

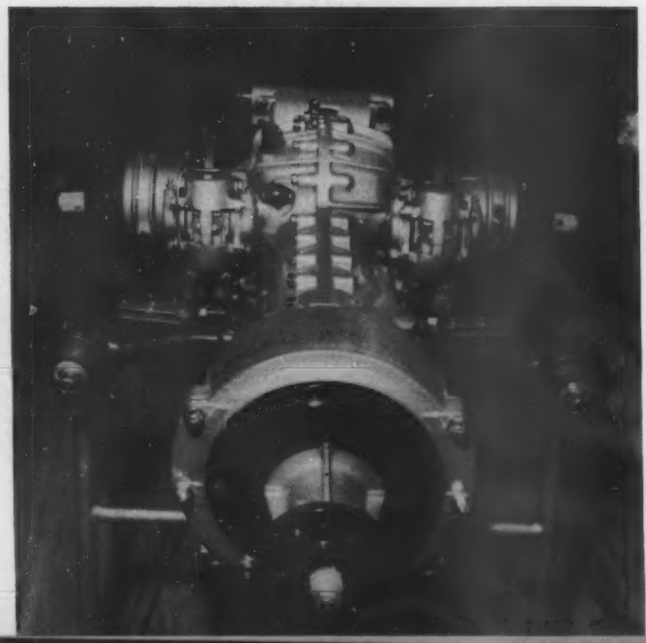
Dr. Tailpipe shook my hand and again I wiped off the grease film. He pointed to the wall bearing an enlarged replica of the school's diploma. It carried a shield emblazoned with a grease-smeared hand reaching for a greenback, under which was inscribed the motto, "Caveat Emptor—or Else!"

"The ideal we strive for," Dr. Tailpipe said simply.

I felt for my wallet, bade the doctor goodbye—and rode home on the bus. Where, I wondered, did bus drivers learn boorishness and the art of dropping the customer's change . . .

LANCIA FLAMINIA G.T.

Slide into the shapely leather seat, swing shut the close-fitting aluminum door, fire up the unique V6 and discover how elegant earthbound motion can become.



► Lancia of Italy builds expensive, luxurious cars, famed for sure-footed road manners and perfection of detail. In its largest series, the 2½-liter V6 Flaminia, there are five body styles to choose from. There is the factory's own Pininfarina-designed four-door sedan, while on a 4¾-inch-shorter wheelbase Pininfarina builds a crisp, comfortable coupe which looks as closely related to the sedan as it is. On a wheelbase shorter by another 9 inches and with the same 131 bhp version of the V6, Touring builds the chic, elegant G.T. coupe (the subject of our test) and the delightfully handsome convertible while Zagato prepares the racily light and lively Sport coupes with their famous double-noggin notches. Though we put in some city driving on both Pininfarina models, we lived with the Touring G.T. coupe for more than 500 miles over the terrain where Lancias shine best: twisting, mountainous secondary roads.

Each of these body types is notable for fine finish and a luxurious leather interior, with chair-height seating in the Pininfarina designs and sports-car-like "channeled" seating in the others. The G.T.'s seats have widely splayed backs but are quite easy to slip in and out of. All three cars were commendably untiring.

Today's Flaminia is a direct descendant of the much-admired Aurelia, the one single car which gave birth to the term *Gran Turismo* in the early postwar era. Some Aurelia features remain, while some have disappeared in the course of development. Remaining, of course, are its heart, soul and skeleton; the aluminum V6 with its longitudinally in-

Lancia's famed transaxle features wonderfully effective Dunlop disc brakes and lightweight de Dion axle. Latter combines both comfort and handling.

clined valves and the rear-mounted clutch and transaxle (only the name is new) at the ends of a frameless chassis. The vintage sliding pillar front suspension has been bequeathed to Morgan in favor of coil springs and unequal wishbones but the de Dion axle with leaf springs of the later Aurelias remains.

The Flaminia's rear axle-mounted gearbox has synchromesh on all of its four forward speeds. The floor-shift lever is a large-diameter steel tube cranked so that your hand falls on it naturally. A spring load must be overcome to place the lever in first or second positions; it is heavy but not as heavy as that which protects reverse, off to the lower right of the H pattern. The synchromesh is infallible but the overcentering spring of the easily depressed clutch pedal seems to delay fast engagement during rapid shifts.

The V6 engine is very smooth throughout its range. It develops peak bhp at 5100 rpm and will go well beyond that although noisily. Such is the flatness of its torque curve that the car will accelerate smoothly in *any* gear from idle. The gear ratios are very well chosen and provide great flexibility. Third, with its range from 18 to 80 mph, is marvelously useful and pleasant.

Even with its 165 x 400 Michelin X tires (the sedans use 175 x 400) inflated to 30 psi, the G.T. coupe's worm and roller steering is heavy under parking conditions. This becomes light as soon as the car is rolling and is one of the world's best systems at speed. The car tracks superbly at 90 mph, asking to be driven all day long at that level. Only above 100 mph does slight wander set in.

The car's cornering behavior is superlative with one exception: quick changes of direction produce pronounced

(*Continued on page 80*)

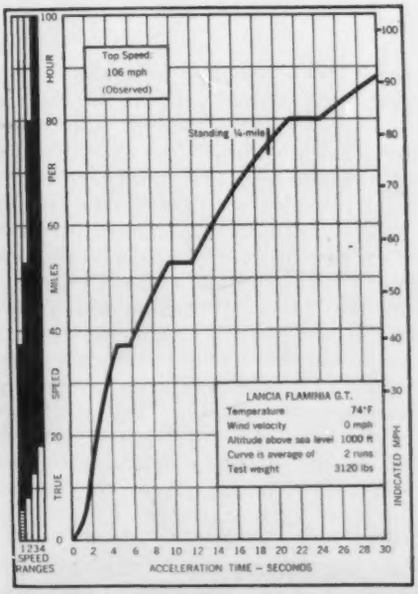
Unmistakably Italian in layout and fine finish, the Lancia G.T. has deep leather seats, sturdy four-speed all-synchro gears, vertical wheel.

ROAD TEST:

LANCIA FLAMINIA G. T.

Price as tested: $6847 POE

Importer: Hoffman Motors Corporation
443 Park Ave., New York 22, N.Y.
9130 Wilshire Blvd., Beverly Hills, Calif.



ENGINE:

Displacement	150.0 cu in, 2458 cc
Dimensions	Six cyl, 3.15 in bore, 3.21 in stroke
Valve gear:	pushrod overhead valves, inclined in longitudinal plane, bell-crank rockers.
Compression ratio	9.0 to one
Power (SAE)	131 bhp @ 5100 rpm
Torque	137 lb-ft @ 3500 rpm
Usable range of engine speeds	900-5600 rpm
Corrected piston speed @ 5100 rpm	2700 fpm
Fuel recommended	Premium
Mileage	17-20 mpg
Range on 18.5-gallon tank	310-370 miles

CHASSIS:

Wheelbase	99.2 in
Tread	F 53.8, R 50.0 in
Length	177.4 in
Ground clearance	4.3 in
Suspension:	F, ind., coil, wishbones; R, de Dion axle, semi-elliptic leaf springs, Panhard rod.
Turns, lock to lock	4.0
Turning circle diameter between curbs	40 ft
Tire and rim size	165 x 400 (both)
Pressures recommended	F 28, R 30 psi
Brakes; type, swept area:	F 11½ in, R 12 in discs; 511 sq in
Curb weight (full tank)	2940 lbs
Percentage on driving wheels	50%

DRIVE TRAIN:

Gear	Synchro?	Ratio	Step	Overall	Mph per 1000 rpm
Rev	No	3.35		12.79	-6.0
1st	Yes	3.09	51%	11.80	6.5
2nd	Yes	2.05	45%	7.82	9.8
3rd	Yes	1.41	41%	5.38	14.3
4th	Yes	1.00		3.82	20.1

Final Drive Ratio: 3.82 to one. (3.92 with wider ratio gears in Pininfarina-bodied cars.)

from leathers to le mans: EDGAR BARTH

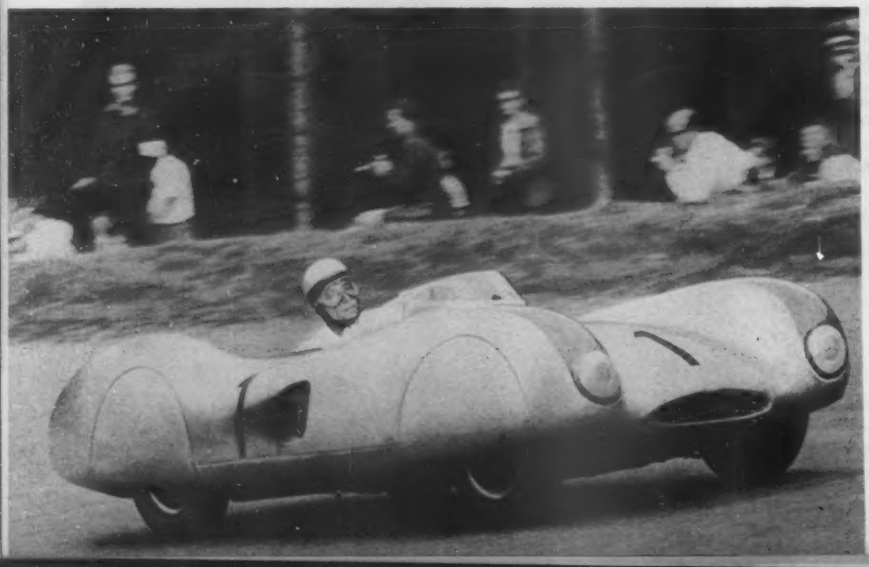
by JESSE ALEXANDER

A skillful driver on two wheels or four, Edy Barth escaped from East Germany to drive and win for Porsche.

WAGNER

After World War II, Barth was quick to seek out motorcycle racing. At Hellerau, above left, he smiled for the fans; elsewhere he took impressive wins riding a Norton Featherbed.

Edy's early car racing efforts included rides in the East German AWE. In 1955 and 1956 the cars competed in western Europe, but were outclassed by Porsches in the 1500 cc class.



FENZLAU

► Born Wilfried Edgar Barth on January 26, 1917, at Herold-Erzgeberge in what is now Eastern Germany, "Edy" (pronounced Eddie) Barth shares his birth year with Maurice Trintignant, he and "Trint" being two of the elders of contemporary motor racing.

By the time young Barth was out of school in 1933, an interest in car and bike racing had won him a job as apprentice in the thriving Auto Union factory at Zschopau. Within three years he had become factory test driver and in no time at all had his international competition license, riding Auto Union bikes on weekend races throughout Germany. Edy had amassed a total of 25 gold, silver, and bronze medals by the time he was called into military service in 1938. An army dispatch-rider career ended abruptly two years later when the sidecar outfit Barth was riding collided with a truck. Nine broken bones put him flat on his back for many months but at least he was judged unfit for front-line duty and spent the rest of the war safely lodged in a machine shop.

Married by the time the war was over, Edy returned home, sought out the DKW factory at Zschopau in hopes of getting his old job back, but as work had not yet been started, he was forced to go into his mother's textile factory as a steady but not-so-interesting source of income.

As soon as fuel and two-wheeled racers were available again, Edy Barth was one of the first to be back in leathers. From 1949 to 1953 he rode 350 Norton, DKW, and Triumph machines; in '53 he pushed an ex-Rudy Knees "Featherbed" Norton to third place in the Schleizer Dreieckrennen. Car racing did not come along for Barth until 1952 when the Rennkollektive Johannisthal asked him to join its stable. This "Rennkollektive" was only another name for the Scuderia Johannisthal which was the basis for the EMW (and later AWE) racing team that was seen in Western Europe during 1955 and '56. Johannisthal itself was famous before and during the war as an aircraft development center possessing a large wind tunnel.

The East German AWE sports cars had obviously been tested in this wind tunnel for they were aerodynamically very impressive. Their welded aluminum body closely followed the contours of the car's chassis to avoid waste space and unnecessary frontal area. Huge "spats" covered the wheels. Mechanics and team organization were very Mercedes-like in their precision and serious attitude toward the job at hand. Unfortunately, the BMW 328 engine which these cars used as a basis for their twin-camshaft racing powerplant was not really up to the Porsches and despite some fierce competition (Avus, 1955) between East and West German cars the racers from Eisenach were not overly successful. Edgar Barth was easily their best driver but at the close of the 1956 season when AWE announced it would not be racing any more, he was out of a job.

When the Porsche factory asked Barth to drive one of its cars in the 1957 1000-Kilom-

(Continued overleaf)

MUELLER

MUELLER

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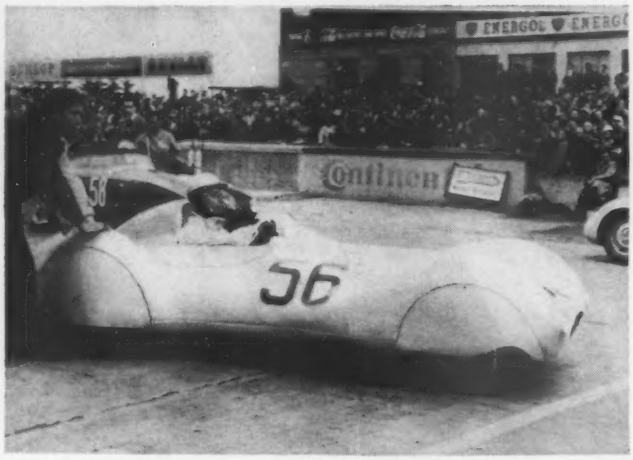
WEITMANN

After the "international incident" following Barth's win for Porsche at the 'Ring, he joined the factory staff in racing and testing cars.



Edy at the wheel of the EMW, an aerodynamic model used when the Communist team competed internationally. This is Nurburg, 1957.

Barth drove the 1960 Porsche Formula 2 car at Modena. Having no fixed preference for F.1 over sports cars, he's "just happy to drive."

eter Nürburgring race he asked the authorities in the Eastern Zone of Germany for permission to accept. They didn't say yes—they didn't say no either, but they did not forbid him to cross over into West Germany to attend the race. Needless to say, once Barth got to Nürburg all the restrictions in the world couldn't have kept him out of that RS Porsche. Not only did he compete that Sunday but he proceeded to win the race as well. Standing on the winner's podium, wreath around his neck, cup in hand, Barth suddenly realized that the national anthem being played in his honor was the *West* German *Deutschland Lied*; at that instant he knew that to return home would be disastrous and might even bring about his imprisonment.

The news of Barth's Nürburgring victory in the capitalistic Porsche stirred things up considerably in East Berlin's Sport Kommisar's office. Edy's license was revoked and a heavy fine was imposed "in absentia." The F.I.A. later ruled that the East German sport authorities had no right to revoke Barth's license and he was quickly granted a new one in the Federal Republic of Germany.

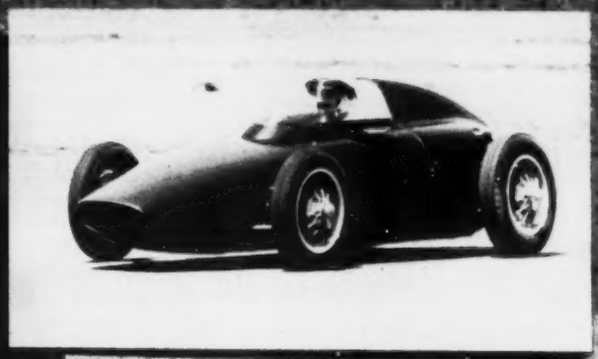
Commencing work with Porsche in Stuttgart that year, Barth began as a mechanic—but in the testing and development department. He was, of course, of considerable value as a test driver, and as a factory team driver his list of racing successes steadily increased. His best year was 1959, when he copped the European Hillclimb Championship as well as the Targa Florio.

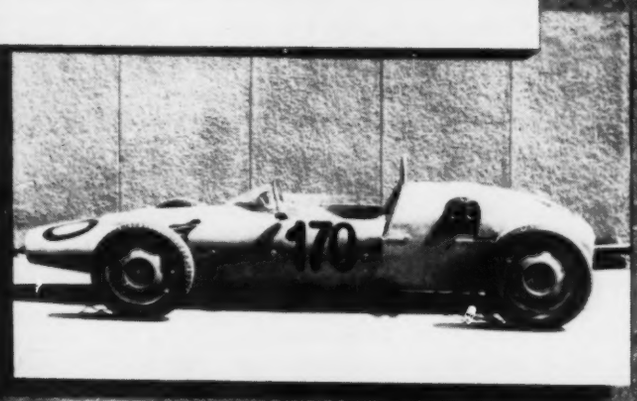
He prefers races like the Targa Florio, loves the Nürburgring but has no great preference between Formula 1 and sports cars. "I'm just happy to drive—any time, anywhere," said Barth.

Leaving everything behind, including his 70-year-old mother, Barth's wife and son came through West Berlin in November, 1957 to join him in Stuttgart where they now live. Barth's present duties at Porsche include the responsibility for all of the factory test cars as well as assisting Huschke von Hanstein's racing department in looking after the needs of competition-minded private owners.

Edy is most proud of the fact that he is the only German driver to receive top awards from both East and Western portions of his country. From the D.D.R. he was once honored with the title of *Meister des Sports* and from the Bundesrepublik he won the *Silberlorbeer des Bundespräsidenten* for his victory in the 1959 European Hill Climb Championship.

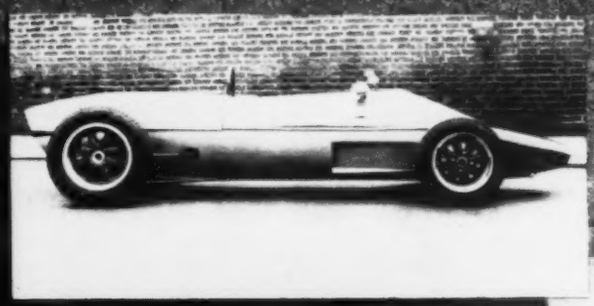
When looking for one descriptive term for Barth, the word "versatile" probably is the most suitable; he has driven almost every type of racing machine with skill and distinction. His warm personality, intelligence, and technical ability have made him one of the most capable all-round men involved in racing today, and Porsche is fortunate to have him in its employ. —*JLA*

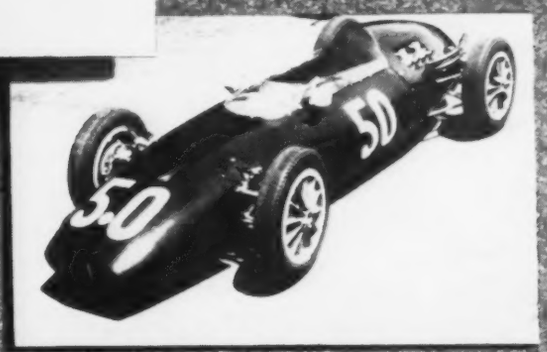




Though Cooper and Lotus still dominate Formula Junior, strong competition is brewing. Here are 12 pages of cutaways of new machines that include two fine Americans: the production-line Dolphin International and the superbly crafted home-built Junior of Nadeau Bourgeault.

4 NEW JUNIORS





DOLPHIN 1

With this rear-engined International model, U.S. factory-built Juniors come of age. Made to go against the best Europe has to offer, this car is sure to make its mark in the battle for Junior dominance.

► During last November's Riverside Grand Prix, John Crosthwaite took a long look at the Formula Junior he and partner Bud Hull were building under the Dolphin tag. It was (and still is) a good car, but he was examining it alongside the newest models from England.

"The comparison revised my entire thinking about Formula Junior," says Crosthwaite. "Our existing car was too high; it had too much frontal area, a fact which was painfully apparent after looking at Lotus's and Cooper's latest.

"We had always considered Junior racing a sort of minimum-cost beginner's game," he says, "and it can be. But it took only one look to convince us that we had to come up with something that would be competitive with the best in the world if we wanted to stay in the business of building race cars."

Thus was Dolphin's Junior International motivated, conceived and born, all in extremely short order. The International succeeds but does not replace their first model, now dubbed the Club and still available. It was described here last December ("Dolphin Means Business").

Is the car as competitive as its builders claim? According to their factory driver, Ken Miles, whose racing reputation stands among the best, it is. Ken admits to considering (at one time) all Juniors as "dogs." But that was before he drove the original Dolphin. It was good and he describes the new one as better. "In drawing a comparison I would say it handles equally as well as the Lotus, although a bit differently in detail. It is extremely comfortable and easy to drive. Best of all, it has no vices!" Strong praise coming from a man of Miles's building-driving background.

Even though Ken considers the car a potential winner in any Junior field, he believes it to be a good beginner's machine. "If anything," he says, "it is too safe. That is, if a new boy masters this car and then climbs into a powerful sports car, he is likely to be in trouble simply because he has never been exposed to the tricks a mishandled race car can perform." An example of "too safe," according to Miles, is the fact that brakes may be applied in the middle of a turn without any qualms.

Ken, incidentally, now has more than a passing interest. In addition to being the factory driver, he was recently appointed western states distributor for Dolphin cars and components (Universal Auto, 4702 Vineland, North Hollywood, Calif.), and he is devoting a great deal of effort to developing the car's Ford powerplant.

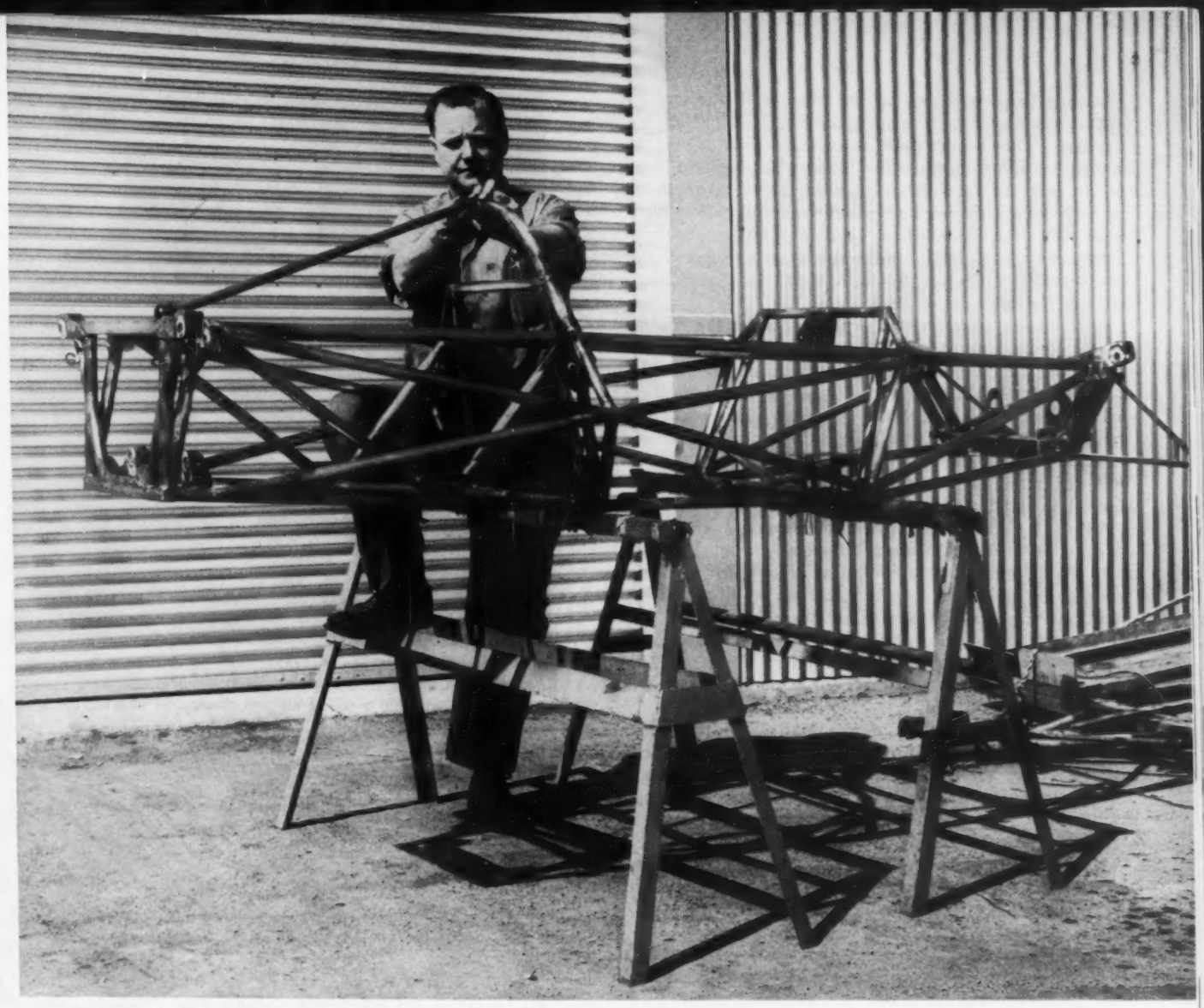
As with the original Dolphin, the International springs from the experience of Crosthwaite. The new car is actually one inch lower overall and two inches narrower in tread than the new Lotus. After finalizing their 71-pound mild-steel multi-tube space frame, the partners asked Dick Trautman (who worked closely in building the Scarabs) to wrap it in aluminum. From this ultra-low prototype body, molds were built for the production of fiberglass bodies. Weight differential between the two materials is negligible; difference in cost is considerable.

The fiberglass bodies, produced for Dolphin by Livesay Fiberglass, El Cajon, Calif., are among the finest quality we have seen. Absolutely smooth and ripple-free, they may be color-impregnated to the customer's choice. So far the most popular color has been black.

Front suspension is a subassembly based on a fabricated box section. Light tubular A-arms are unequal-length and utilize Dolphin coil spring-shock units that may be built to order for any car. Drilled backing plates are Fiat, mounting an NSU Prinz spindle. Included is a small-diameter anti-roll bar. Steering is rack and pinion — a Dolphin rack in an NSU housing.

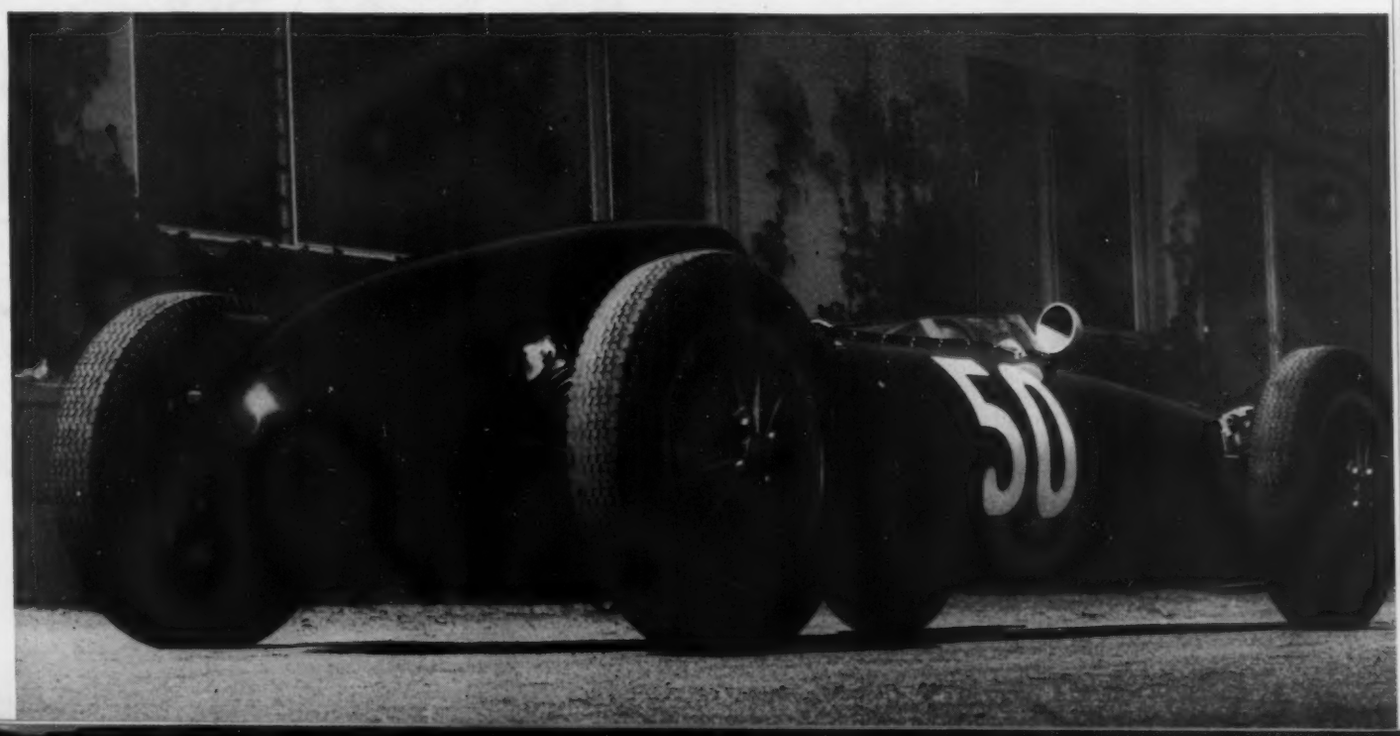
At the rear is the key to the Dolphin's fine handling: a fully-independent suspension that can be adjusted to suit driver and course. Hub carriers are rugged but feather-light magnesium. Both upper and lower suspension arms are threaded to take Heim joints at their inner ends for turnbuckle-type camber adjustment. While the lower arm is A-shaped, the upper is a single tubular strut. As at the front, coil-shock units are used. Two long parallel radius rods, which locate the hubs, are threaded and Unibal-jointed for toe-in control. Compared to the Club model, the International's rear roll center has been lowered about one inch to a point five inches above the ground. Also, the center of gravity is lower.

While it is possible to design low-to-the-ground cars, no one has yet discovered a method of contorting the human body to fit. For this reason Dolphin seating is semi-reclining, angled back 40 degrees in a comfortably contoured fiberglass bucket. As with all their components, these seats may be purchased separately — $35 plain, $50 upholstered. A driver's arms reach out almost straight to the leather-covered 13-inch Derrington wheel. Any appreciable arm bend would soon find elbows colliding painfully with frame tubes. At 1¾ turns lock-to-lock, the probability of (*Continued overleaf*)



Designer Crosthwaite checks roll bar support on new frame. Weight without brackets is 60 pounds. Outrigger diagonals meeting outboard at roll bar section take loads from unbraced cockpit area. Besides adding torsional rigidity they offer protection to the driver from side collisions.

New body shape, with its reduced frontal area, helped car clock 116 mph its first time out on Pomona's slow circuit. This is some seven mph faster than the old car's time on the much faster Riverside track. Crosthwaite estimates that new model should do 125 mph on Riverside's back straight.



changing hand positions on the wheel will be slim.

Dolphin has 15-inch magnesium wheels cast to their specifications. They weigh only about eight pounds and are designed to pump air into the brakes. Installed on the front of the car are four-inch-wide rims; at the rear they have recently gone to a five-inch with excellent results. They also have a 4½-inch-wide wheel available. These wheels, which have been tested and found many times stronger than comparable steel units, are for sale at $65 each and offer wide latitude for other racing applications.

As Formula Junior enthusiasts are aware, the engine currently dominating the field is Ford's Anglia, the 105E. This is the mill Dolphin uses, having switched from the now-outclassed Fiat. Modified by Superspeed of London, the fully balanced engine is rated at 86.5 bhp at 7600 rpm. Displacement is 980 cc with compression rated at 11 to one. A pair of two-throat 40 DCO3 horizontal Webers on a Dolphin-designed manifold feed the pump gas through mirror-like ports.

Although Ken Miles is proceeding with engine development, any worthwhile improvements will be incorporated into Superspeed's work. Dolphin prefers to buy engines ready to go, rather than operate its own modification department. At the moment Ken is shooting for something over 90 bhp, which he feels he will need by the season's end. And he feels that before the 105E has had its day it will not be uncommon to squeeze 100 horses out of the engine. Of course, as Ken says, "It gets a bit brittle up there."

Mounted aft of the engine is a Fiat 600 transmission-differential unit. Not only are these units sturdy and inexpensive to repair, a large number of ratios are available from various Italian manufacturers. Miles advocates leaving the transmission synchro rings out. He states that quicker shifts are possible — and there is no need to double-clutch.

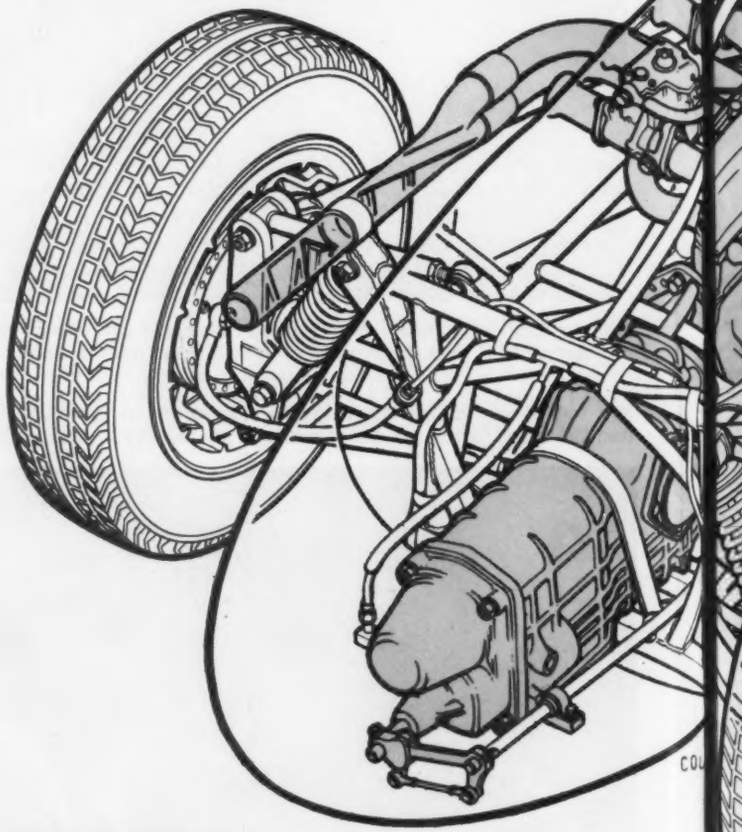
The fuel tank, which was under the driver's knees on the original models, has been moved to the cowl. Of aluminum alloy wrapped in fiberglass, it complies with USAC safety regulations. Tank capacity is six gallons and as the car delivers between eight and nine mpg while racing, the possible race length is easy to determine. According to Miles two side tanks will be available for longer races.

The first race at Pomona in the first International proved to be one of those tantalizing defeats that drive car builders crazy. Because he had not run on Saturday (and had had no practice in the car) Miles was started in 14th position for the Sunday event. He fouled a plug on the line and moved off to a ragged start. Then the plug cleared and Ken began to move up. By race end he was in 2nd spot, only six seconds behind winner Jack McAfee in a Lotus. During the event Ken set a lap record for Juniors and was moving up so rapidly that it was McAfee's good fortune that the race was not two laps longer.

Dolphin Engineering is a young organization. In business since December 1959, it built nine complete cars in the first series, not counting the many kits and miscellaneous components sold. They have orders for three cars to kick off the Internationals and will undoubtedly receive more orders as the season progresses. Price of the complete car is $4895, ready to race. It comes with, of all things, an owner's manual and spare parts list. They offer a $300 discount to anyone willing to shell out his cash in advance. Minus engine and transmission, the car goes for $3795, f.o.b. 1080 North Johnson, El Cajon, Calif. Should tastes run to do-it-yourself techniques, there is a substantial saving. The International kit is $1995 while the Club is $1595, both engineless of course.

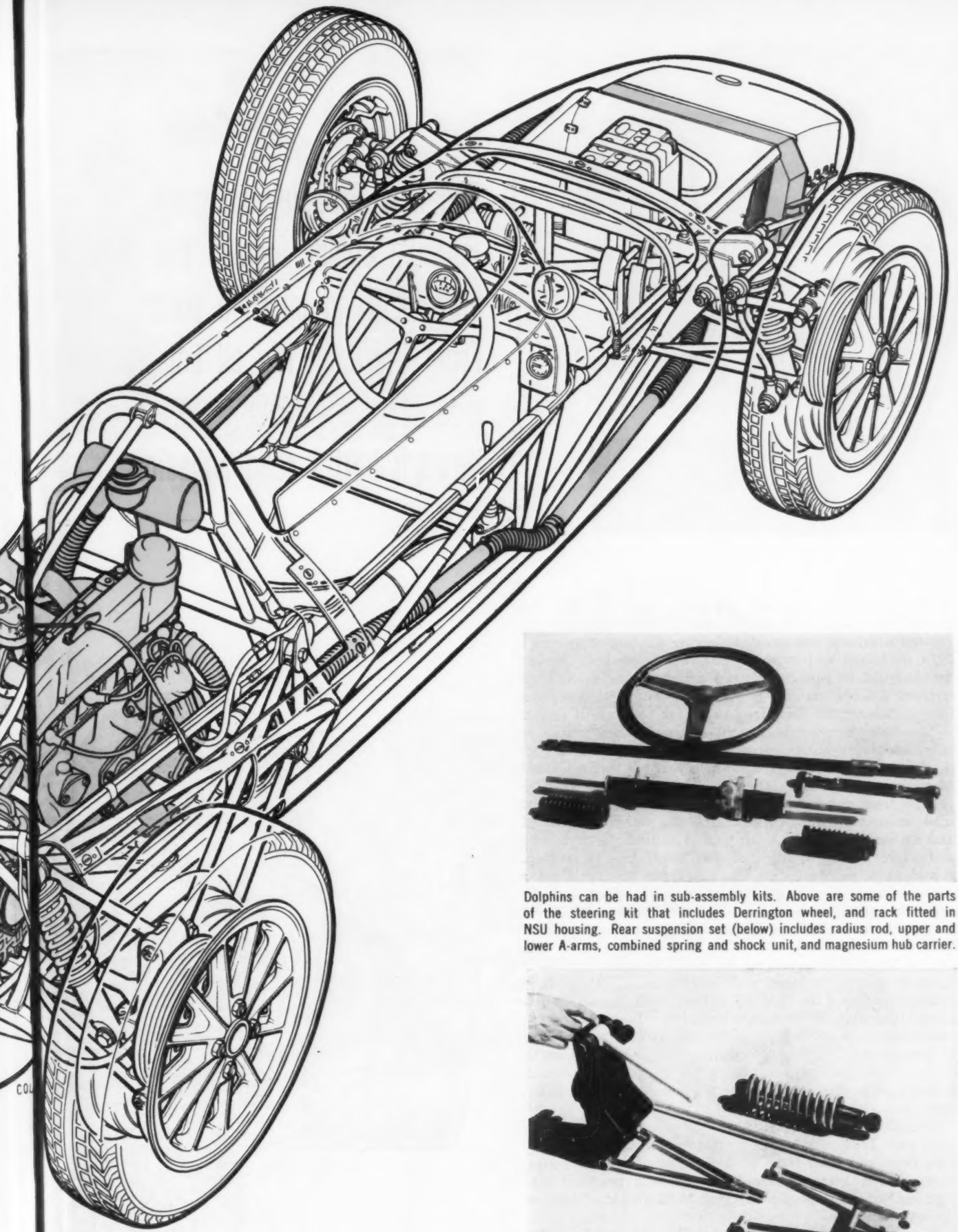
Interest in the new car has been widespread, including some from England. Ex-Briton Crosthwaite says that he would like nothing better than to sell one in England. It's not that it would open up a market, but it would inflate his ego considerably! —*Wayne Thoms*

Front suspension is virtually unchanged from the original Dolphin Junior. Unequal-length welded tubular A-arms are attached to NSU Prinz spindles on the wheel side with a coil spring and shocker set between the arms.

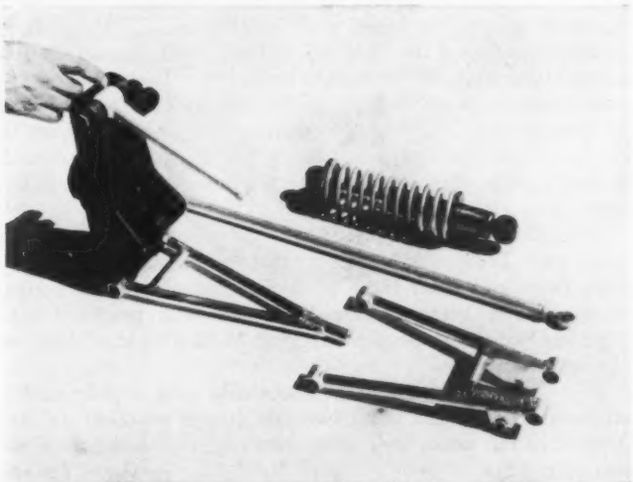


DOLPHIN SPECIFICATIONS

Engine	Superspeed-Miles-modified Ford 105E
Displacement	980 cc
Power	86.5 bhp @ 7600 rpm
Gearbox	Fiat 600
Number of speeds	Four
Wheelbase	88 in
Tread	47 in
Suspension type	F, ind., wishbones, coils, anti-roll bar; R, ind., wide-based wishbones, coils.
Brakes	Fiat 600 Multipla drums



Dolphins can be had in sub-assembly kits. Above are some of the parts of the steering kit that includes Derrington wheel, and rack fitted in NSU housing. Rear suspension set (below) includes radius rod, upper and lower A-arms, combined spring and shock unit, and magnesium hub carrier.



2 LOLA

The new Broadley-designed Formula Junior follows the current trend up to a point. From there on it's all Lola, which means race-winning ways through better road adhesion.

► While the Lola was generally considered 1960's most successful front-engined Junior, it was the year that saw rear engines dominate the scene. Following the sage if-you-can't-lick-em-join-'em racing philosophy, the latest Lola Juniors are designed to equal or exceed performances of the rear-engined Lotuses and Coopers. Early tests of the new car have bolstered Eric Broadley's hopes for a successful season.

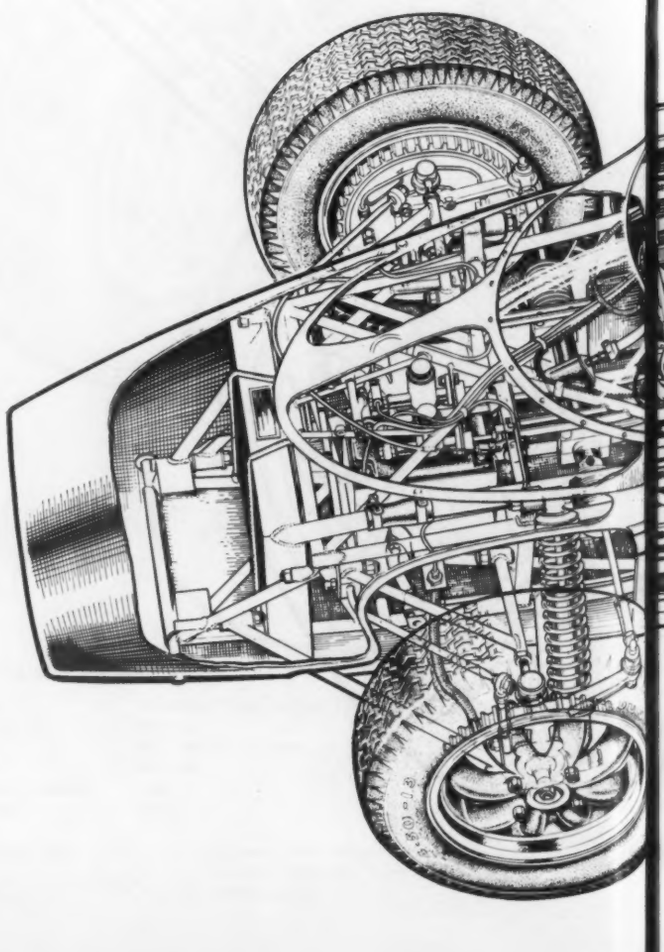
The Lola, despite its obvious mechanical similarities to other contenders, retains some individuality. Part of it rests in the distinctive fiberglass body conceived by Specialised Mouldings of Croydon. The driving position, too, is a departure from general practice, being much further forward than in contemporary cars. This is the result of the fuel and dry-sump oil tanks being placed behind the seat. The pedals are placed in front of the "axle" line yet control is said to be unimpaired.

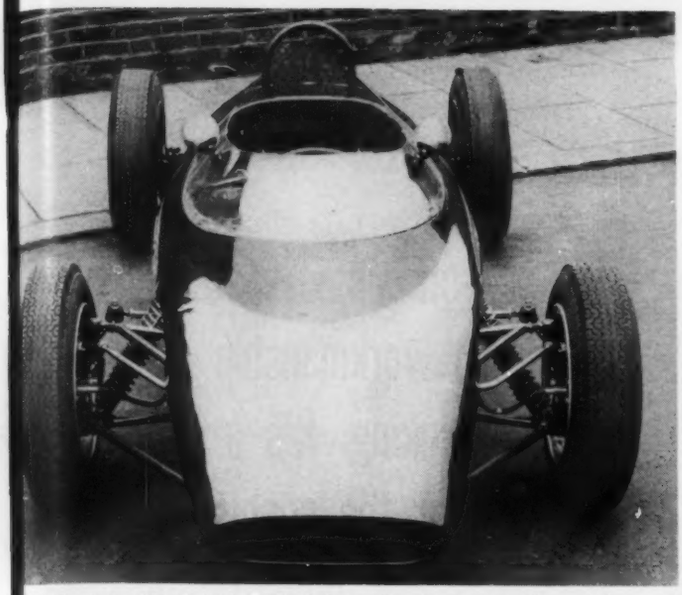
A further novelty is the ease with which the power unit and drive train can be wheeled away from the rest of the car by one man in about 20 minutes, simply by undoing four bolts and controls. The stiff space frame is made of 1 inch and ¾-inch 18-gauge round, mild steel tubing, with the chassis consisting of a series of bulkheads.

The Superspeed-modified 997 cc Ford 105E engine has dry-sump lubrication. With its two twin-throat Weber carbs and other modifications, it develops 85 bhp at 7200 rpm. Tilted 15 degrees to the left, it allows the shift controls to pass to the modified VW gearbox which has five speeds forward. Ratios can be changed without removing the transmission from the car.

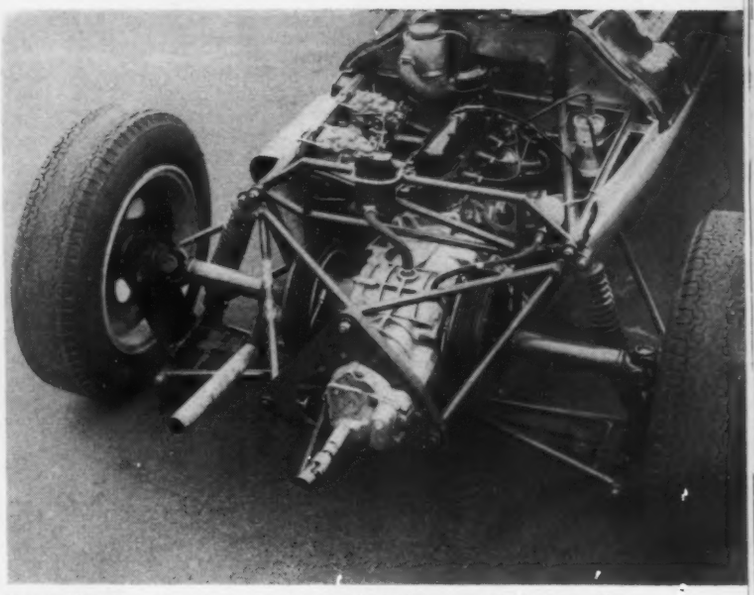
The "factory" Lola will be driven by Peter Ashdown this year and Lola will support two other cars driven by Dick Prior and John Hine in major Formula Junior events. Cars are also being produced for sale with modified rear paneling to eliminate the "sagging at the middle" look of the prototype.

With a full-scale Formula 1 machine only a poke and a stroke away from the latest Formula Junior practice, it's also possible that Broadley's new rear-engined Lola may be the progenitor of such an effort for 1962. ***—David Phipps***

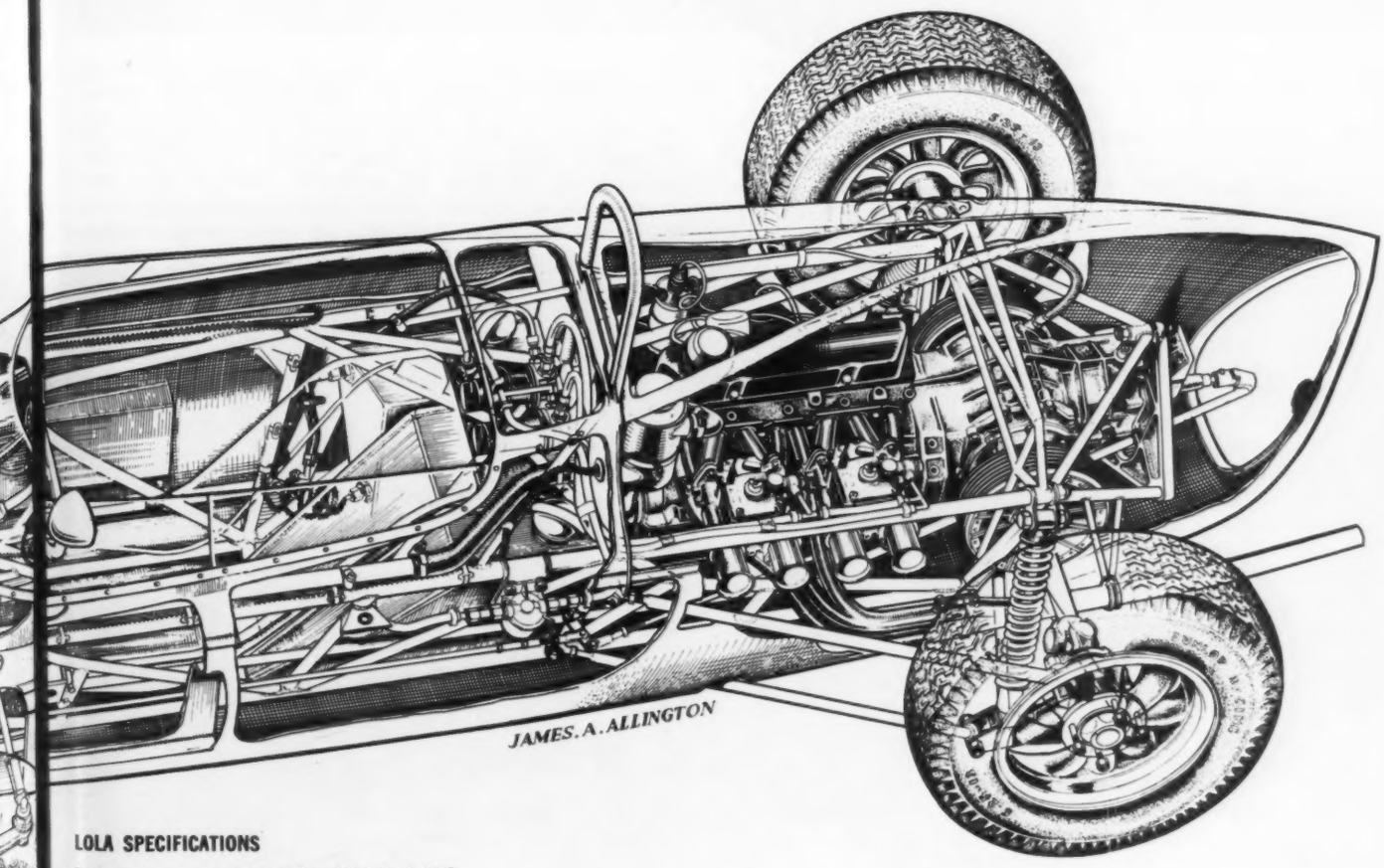




The Lola driver's feet nestle between the front suspension members, yet despite his extreme forward placement neither the handling nor the looks are damaged. The effective "windshield" line starts below the wheels.



Simple Broadley rear suspension has inspired Chapman, others. The effect of added rear roll stiffness was experimentally assessed by fitting the two-leaf transverse spring, as shown here, between the lower wishbones.



LOLA SPECIFICATIONS

Engine	Superspeed-modified Ford 105E
Displacement	997 cc
Power	85 bhp @ 7200 rpm
Gearbox	Volkswagen-based
Number of speeds	Five
Wheelbase	88 in
Tread	48 in
Suspension type	F, ind., wishbones, coils, anti-roll bar; R, ind., parallel radius arms and stressed half-shafts, coils.
Brakes	Finned drums, inboard rear

BOURGEAULT 3

This one-off single-seater glows with good workmanship and original thinking. It's a mobile test bed for the sophisticated suspension and construction ideas of builder Nade Bourgeault.

► "That's it in a nutshell – a rolling laboratory."

Nadeau Bourgeault was at his shop looking at his Formula Junior. He continued, "Body building and chassis design are my profession. When Formula Junior was introduced I realized it presented an excellent opportunity to display my wares and experiment with chassis design."

That too-simple statement capsuled over two years of astute designing and meticulous building after business hours and on weekends.

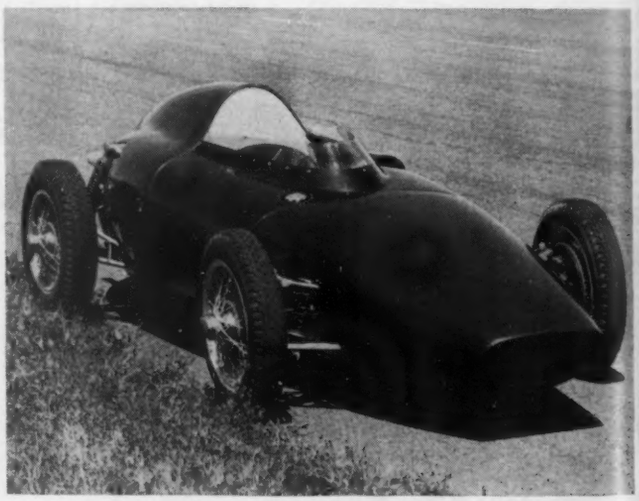
Back in the days of Stanguellini Junior dominance, Nade chose a rear-engine layout for its low polar moment (for twisty U.S. tracks) and fine traction, though from an appearance standpoint he would have liked a long hood. He also selected a Fiat engine, since hop-up components were already widely available for it. Bourgeault felt he had enough development work to do on the chassis without getting deeply involved with engine modifications.

A Fiat engine was duly purchased from the local wrecking yard, as were the Fiat brakes, spindles and spindle supports. A VW transmission was chosen because with mods it would accept Porsche gears. Nade mated the Fiat engine and VW transmission with a magnesium plate and fabricated an inlet manifold for the Weber carburetors. He then took pictures of the entire unit, enlarged them to scale and transferred its configuration to drawing paper. He did the same with the drums and Borrani wheels. At this time a target front/rear weight distribution of 40/60 was selected for the desired handling characteristics and all components were weighed and placed on paper for this distribution.

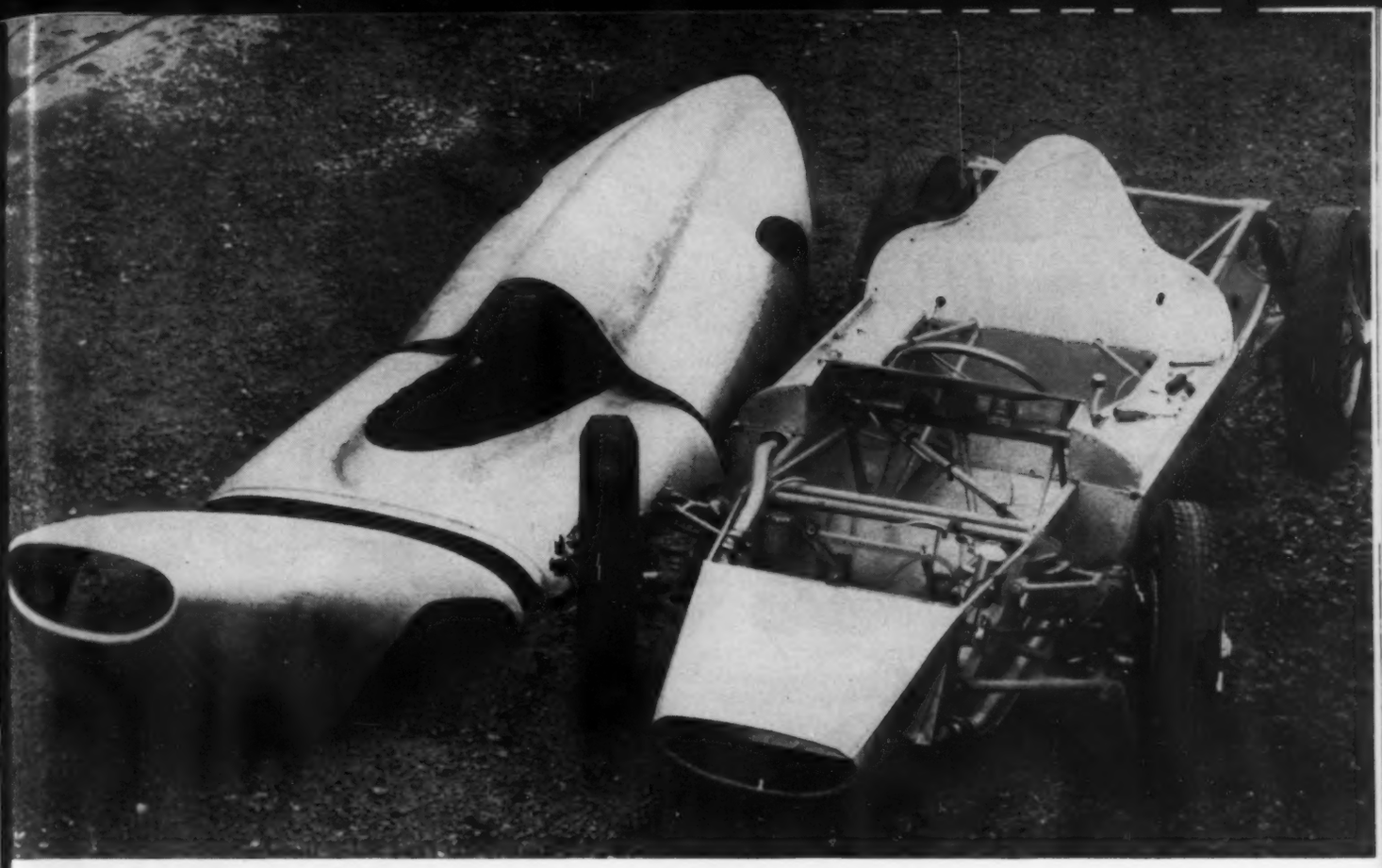
The design of the frame is fairly simple with straightforward usage of 1, ¾ and ⅝-inch square and round tubing. All tubing is of 18 gauge wall thickness, with the exception of the ¾-inch, which is either 20 or 16 gauge depending on the location and usage. The weight of the bare frame is 58 pounds.

On the subject of weight, the target of 880 pounds was only difficult to build up to. The car could have been built 175 pounds lighter, but as long as there was a weight minimum, Nade's thinking was along the lines of what would be necessary to stand the gaff of Formula 1 racing. As Bourgeault put it, "If you're going to have weight, you may as well have it functional. The car is actually excessively strong as a Junior."

The Fiat went through deep-breathing exercises. An eight-counterweight Giannini crank is used with Trione TR-20 aluminum bearings. The bearings had to be chamfered to clear the large radii on the journals. (*Continued overleaf*)

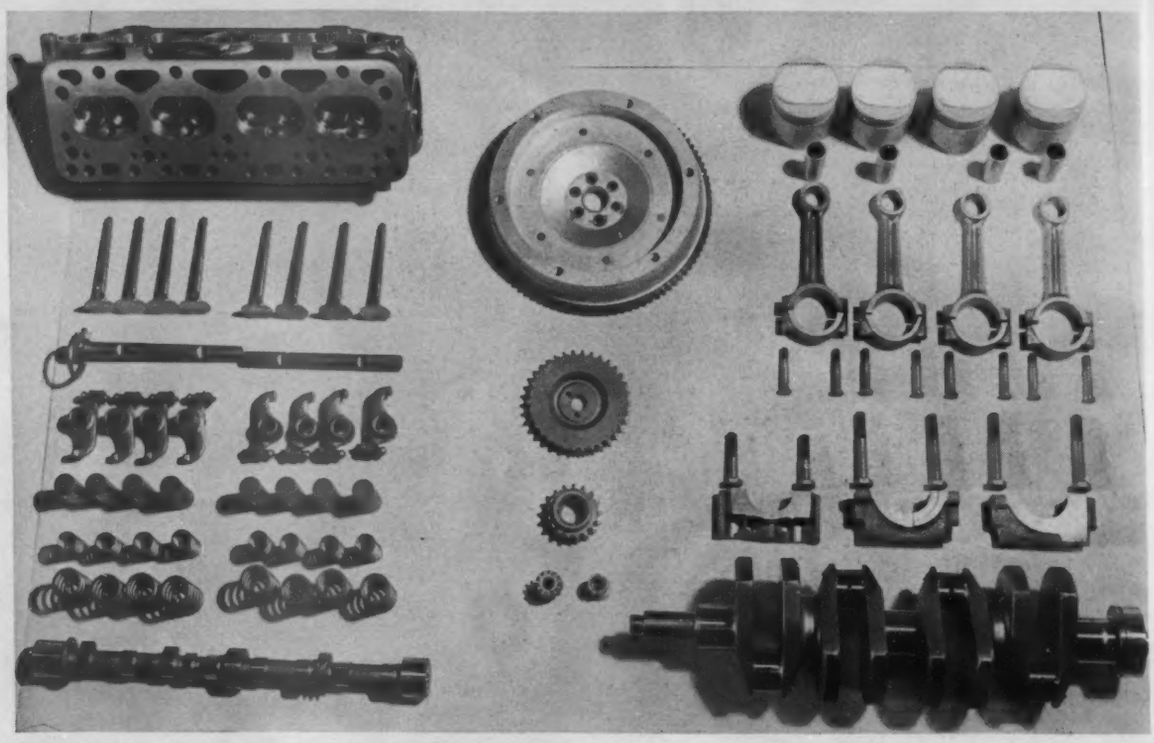


Front of Bourgeault Junior can be lifted by its lightweight nose. It's braced inside by ½-inch, 20-gauge tubing and stressed aluminum ducting, and conceals a 7.3-gallon fuel tank and a very refined cooling system.

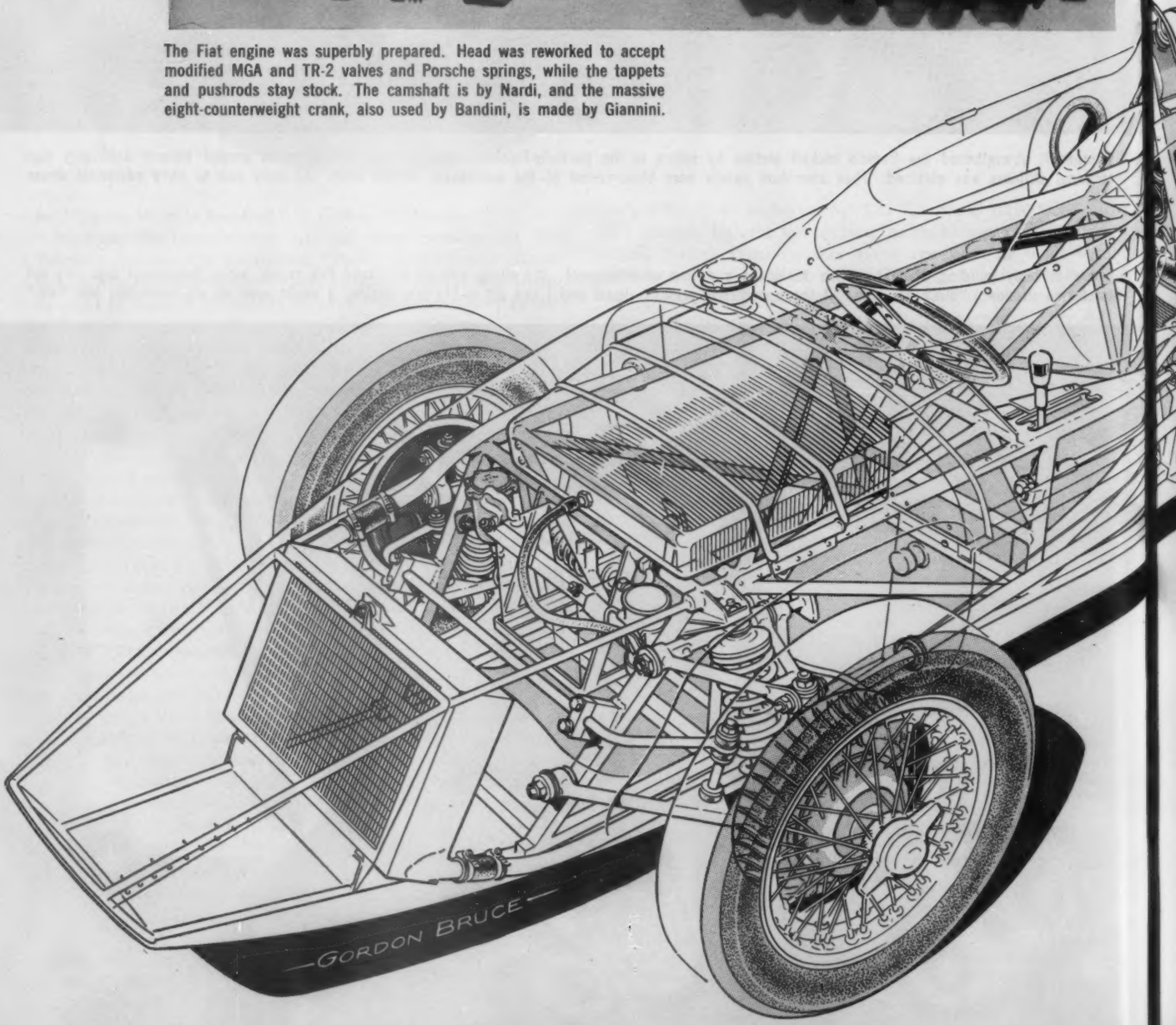


Bourgeault strengthened the frame's cockpit section by sitting in the partially-finished structure and adding tubes around himself until very high torsional stiffness was obtained. Then aluminum panels were blind-riveted to the bulkheads, cockpit sides and belly pan to carry additional stress.

A pro at body building, Nade built his Junior as a rolling advertisement. It's strong enough for Grand Prix racing, which Bourgeault says he's not interested in now. "But," he adds, "if the opportunity presents itself and I can get a 1½-liter engine, it would open up an interesting new field."

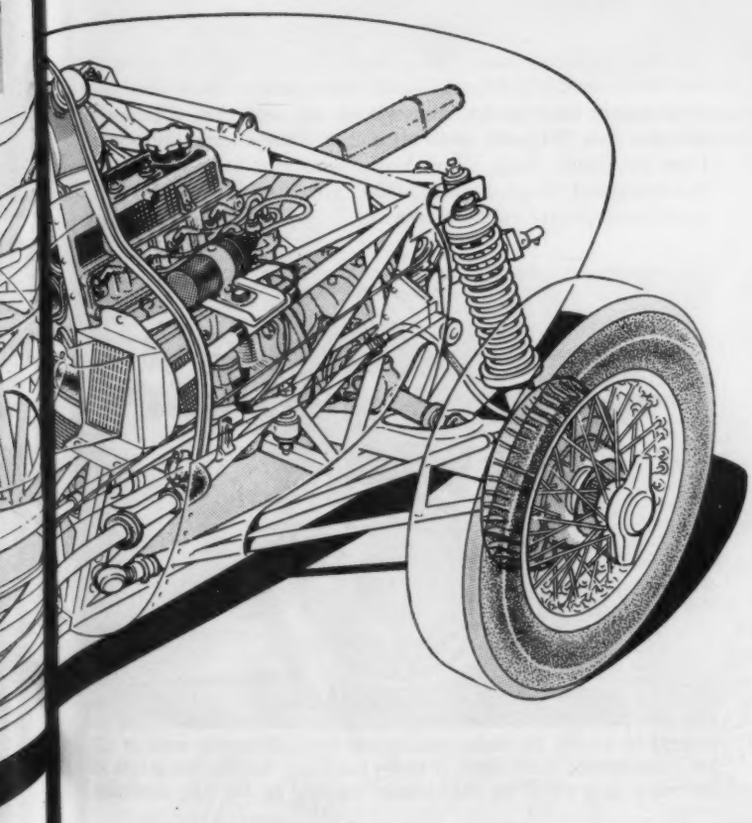


The Fiat engine was superbly prepared. Head was reworked to accept modified MGA and TR-2 valves and Porsche springs, while the tappets and pushrods stay stock. The camshaft is by Nardi, and the massive eight-counterweight crank, also used by Bandini, is made by Giannini.



Fiat rods were highly modified to produce a larger wrist pin offset than is used with the stock engine. Borgo pistons are used, their highest compression ratio being 8.6 to one. The head was milled 0.090 inch, resulting in a ratio slightly over 10 to one. Conrero's suggestion of 35 mm intake and 31 mm exhaust valves was followed, with much combustion chamber reshaping necessary. A Fiat 1200 cylinder head gasket is used because of this. The center siamesed exhaust port was split for use with the fabricated extractor exhaust manifolding. Weber 40 DC03 carburetors are mounted on the fabricated intake manifolding and cushioned with Alfa neoprene connectors.

A Nardi oil pump, with necessary sump changes, was installed. The pump output is fed into a Purolator full-flow filter, then through the eleven-fin-per-inch, three-tube oil cooler which receives air through a duct in the cockpit cover on the driver's left. The cool oil then goes through a block which contains the sensing units for pressure and temperature gauges and then flows to the bearings. A modified pressure-relief valve keeps the oil at 80 psi at 180° F and 5000 rpm. These modifications increased the oil capacity by two quarts.



BOURGEAULT SPECIFICATIONS

Engine	Bourgeault-modified Fiat
Displacement	1096 cc
Power (estimated)	85 bhp @ 6800 rpm
Gearbox	Volkswagen-Porsche
Number of speeds	Four
Wheelbase (adjustable)	79.0 to 80.5 in
Tread	F, 48.5 in; R, 46 in
Suspension type	F, ind., wishbones, coils, anti-roll bar; R, ind., low-pivot swing axles, coils.
Brakes	Fiat drums

With a rearward weight bias, Bourgeault's suspension design thinking went like this: most of the roll couple would have to be taken by the front of the car, which indicated a ⅝-inch anti-roll bar, a 48½-inch front tread and 90-lbs/inch springs around the Girling dampers. An anti-Ackermann effect was designed in the steering, so that when the front wheels are turned they will toe in to compensate for the larger slip angle produced by the heavy outside wheel loading.

The front lower suspension arms are fabricated from 1-inch, 16-gauge seamless mild steel tubing. The upper arms are made of 18-gauge, ⅝-inch tubing. Spindle support brackets are ⅛-inch mild steel. Control arm bushings are modified Fiat, of the bonded rubber type. Camber adjustments are effected by shimming the upper control arm pivot where it attaches to the frame. Roll centers, both front and rear, are 5½ inches above the ground.

Rear swing axle arms were fabricated from 18- and 16-gauge steel and welded to the backing plates via the hub carriers. Angled mounts from the backing plates to the hub carriers provide the lower mounts for the VW shocks and 140-lbs/inch coil springs. Ears on the swing axle arms carry the triangulated trailing arms, which are adjustable for length at their three anchor points. There is a vertical adjustment for roll toe-in, as well as a longitudinal adjustment for the low pivot points of the swing axles. Thus the rear suspension may be tuned by changing the roll center height (with the adjustable spring clamps) and the static and roll toe-in. The wheelbase length can be varied 1½ inches.

A stock VW transporter clutch is operated by an ⅛-inch stainless steel cable. The clutch is mounted on a fabricated 6061-T6 aluminum flywheel, using Raybestos non-metallic lining. This aluminum application has been used successfully by Bourgeault on other specials. The unfaced aluminum flywheel wears quite well, has a good coefficient of friction, is light in weight and, most important, dissipates heat at a great rate.

The body panels were formed by Bourgeault on a power hammer from 0.032-inch 3003-H14 aluminum. The stressed panels are made from 6061-T4. With the removal of two Bungee-anchored clips the entire tail section can either be hinged back, or, once in the open position, lifted off its hinges. The cockpit cover *cum* nose section is bolted in place and can be removed in a few minutes. The entire weight of the outer body skin is a little over thirty-four pounds. The car is finished in a dark blue metallic lacquer and would be a show-stopper at any concours.

After several runs on the test track Nade says he "couldn't be more pleased. The traction is excellent from a tight corner. It'll slightly understeer on a trailing throttle and shows a slight oversteering reaction when I really get on it." The front wheels carry a healthy 5½ degrees of caster, which suits his driving style. "It's just quicker to let the wheel snap back from caster reaction than to unwind it from a slight reverse-lock position," Nade explains.

Another thing that particularly pleases Bourgeault about the car is the positive shifting linkage. The third one he built for the car, it's a clever use of a solidly-mounted rod into which the shift lever ball fits. The pivot for the lever is supplied by ears from the sliding tube encircling the bar, with longitudinal and torsional movements going almost straight back (via Apex universals) to the VW housing.

This car is truly a rolling laboratory for Bourgeault's thinking. Not one unit has come under his close scrutiny without one thought: can I make it better? This is the sort of thinking that keeps whittling away at lap times around the world.

—Charles Hamilton

4 DAGRADA

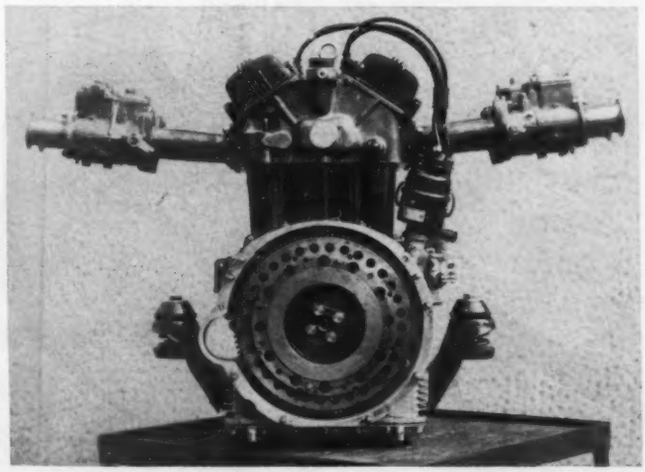
Italy, the birthplace of Juniors, will fight to regain its initial lead with this power-packed rear-engined Dagrada. With its crackling V4 Lancia now in a good chassis it could do the job.

► With its opposing twin-throat Weber carburetors projecting like vestigial wings, the 1961 Dagrada joins the ever-increasing ranks of rear-engined Formula Junior machines.

The latest model is radically different from the front-engined car track-tested in the September, 1960 SCI. While it still uses Angelo Dagrada's highly-modified version of the V4, 1090 cc Lancia Appia engine, the powerplant mates to a Lancia Flavia-derived transmission, allowing the use of four-wheel independent suspension.

Brakes based on Fiat 1100 units handle the stopping action. The "conventional" Dagrada engine, which develops 100 bhp (CUNA) may be retired before long. Dagrada is experimenting with a 995 cc version developing 95 bhp since the smaller displacement would permit fielding lighter-weight cars. The 75 mm stroke would be unchanged but the bore would be decreased from 68 to 65 mm. The exercise is expected to show whether the English have the right idea in sacrificing cubic inches for a pared weight.

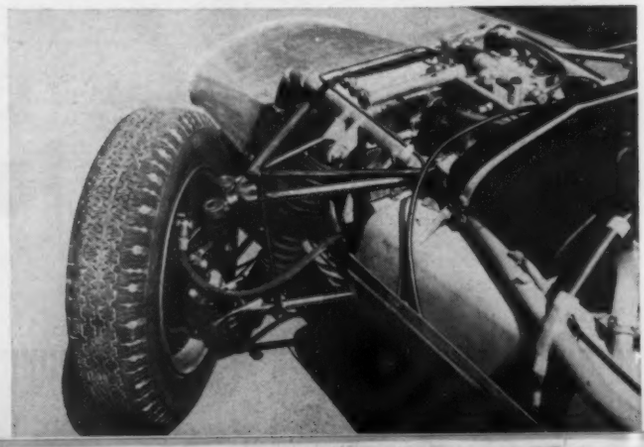
The tube frame, built from 11/16, 13/16 and 1½-inch chrome-moly steel, weighs just 46 pounds. When suspension supports are added, the figure is 68 pounds. Ready-to-roll, the Dagrada has a front/rear weight distribution of 47 and 53 percent respectively, with the 105-pound Flavia transmission adding to the tractive poundage. The prototype is bodied in aluminum, but later cars will have a fiberglass body which tips the scales at about 40 pounds. Using 5.25 x 13 tires on the front and 13, 14 or 15-inch tires at the rear, Amadori light-weight magnesium disc wheels are featured. The price for the new Dagrada will be $5250 from Biener Imported Cars in Great Neck, New York, who can still supply the front-engined Dagrada for $4800, now fitted with the wild multi-megaphone exhaust system. —*Pressauto*

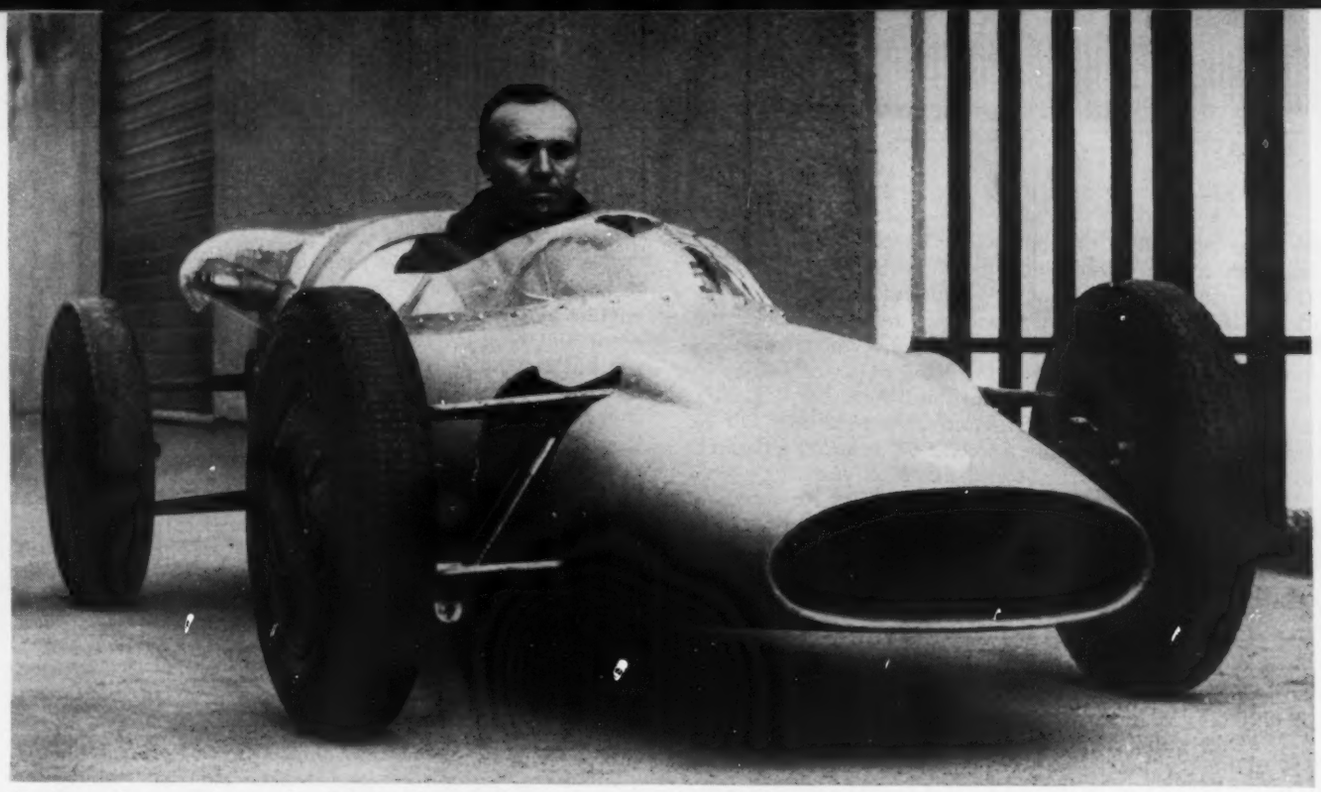


Dagrada transforms the docile Appia engine into a screaming mass of GO. The most obvious modification is to the breathing. Cutting the length of the intake ports within the head creates the need for the long manifolds.

It doesn't take long for Italian speed merchants to recognize the value of production parts in racing cars. The new Lancia Flavia's front-wheel drive transmission looks right at home in its rearward Dagrada mounting.

Dagrada did more than move the engine to the rear for his new car. He switched from heavy stock-Fiat front-end parts to tubular fabricated pieces. The frame tubes double as ducts to carry coolant to the radiator.

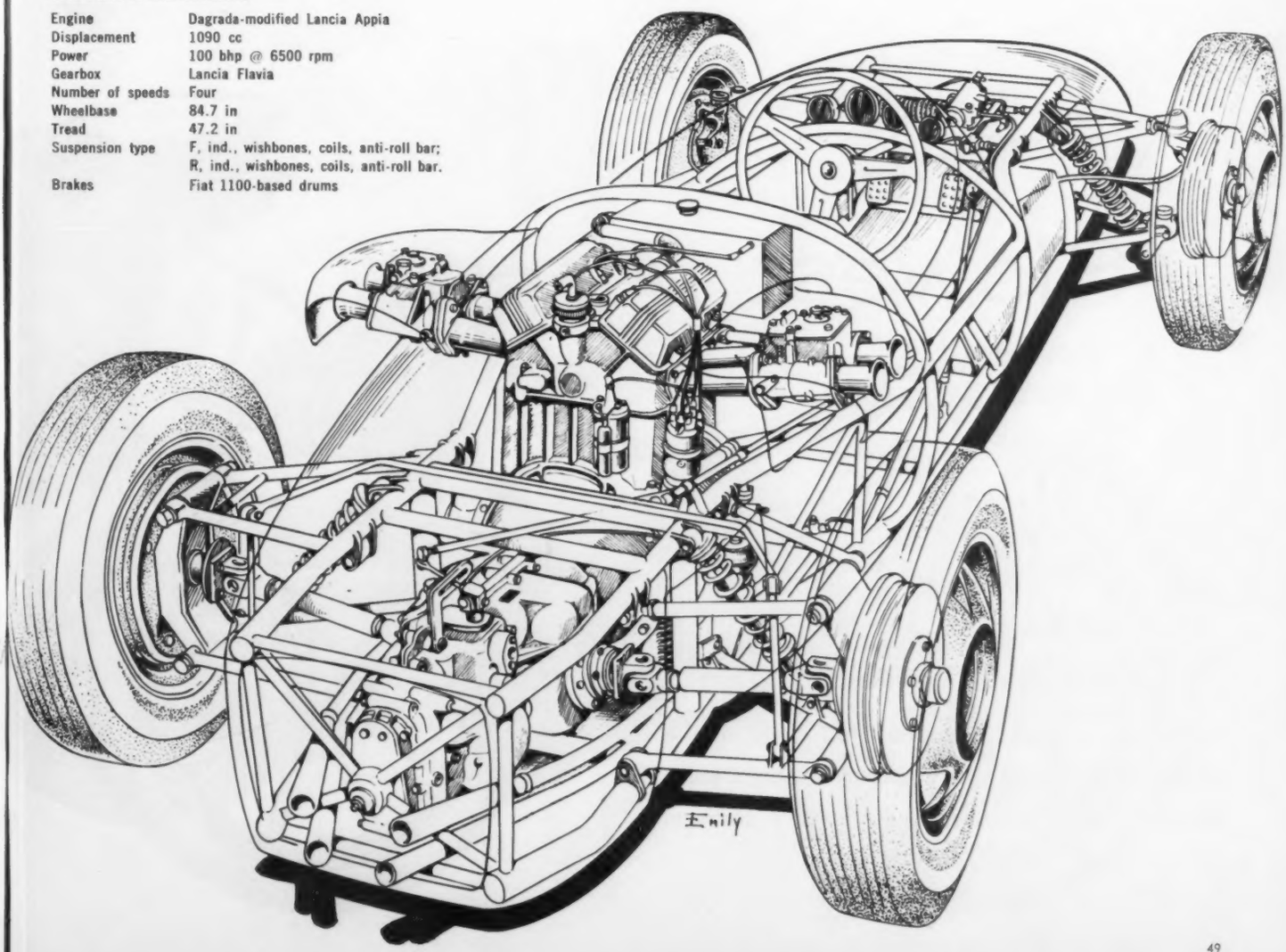




Wearing a grim expression, as if anticipating the tough competition expected among the Juniors this season, Angelo Dagrada sits behind the wheel of his latest rear-engined car. Much tauter than last year's front-engine machine, the 1961 edition shows a general sophistication of design.

DAGRADA SPECIFICATIONS

Engine	Dagrada-modified Lancia Appia
Displacement	1090 cc
Power	100 bhp @ 6500 rpm
Gearbox	Lancia Flavia
Number of speeds	Four
Wheelbase	84.7 in
Tread	47.2 in
Suspension type	F, ind., wishbones, coils, anti-roll bar; R, ind., wishbones, coils, anti-roll bar.
Brakes	Fiat 1100-based drums



The Slowest Car in the World

by Dennis May

Rolls-Royce engines have come full circle with a modern V8 that harks back to a 1905 bent-eight which served to power a 20 mph gentleman's carriage.

► In its espousal of the short-stroke V8 engine, Rolls-Royce was both a hop ahead and streets behind U.S. thinking. The oversquare aluminum powerplant launched by the RR-*juxta*-Bentley coalition a year ago last September, and now standardized throughout its ranges, seemed to be yet another example of the well-known Rolls policy of waiting to see which way the cat would jump and then jumping after it. It was, too, in the modern context, but it's only fair to recall that this was the make's second V8 venture, separated from the first by four reigns and fifty-four years.

The original V8 Rolls, introduced by Henry Royce to an audience of newspapermen and car trade notables at a dinner in London in celebration of the make's successful racing debut in the 1905 T.T., was not a flashy performer. In fact, in one of its two forms it rated the title of the Slowest Car in the World (also the Best, of course). Intentionally, it was capable of 20 mph and no more, on the flat, up hill, down hill, up wind, down wind.

At this date, and for many years to come, the legal limit on the roads of Britain was 20 mph everywhere, so Rolls built a governor into his V8 that made it physically impossible for an owner to fall foul of this article of the law. To underscore the point he christened the car the Legalimit. The first one built was bought by Sir Alfred Harmsworth, founder of the London DAILY MAIL and the father of popular daily journalism in Britain.

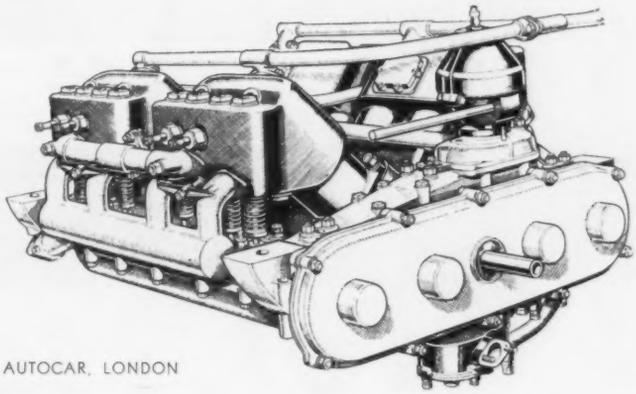
The same engine was used in a hoodless town car that "takes up very little more room than a cab without a horse", to quote the contemporary AUTOCAR. This variant, with the engine under the floorboards, was Royce's answer to the silent and odorless electric broughams that were making a big bid for London's carriage trade during Edward VII's reign. The Rolls V8 landaulette couldn't quite dispense with a gearbox, as the electric competition naturally did, but Royce made his engine so flexible the car could be and normally was started from zero on the highest of its three gears. Moreover, of course, it wasn't handicapped by the broughams' parochial between-charges range.

Obviously, a town landaulette would seldom if ever be driven by anyone but a chauffeur, and it may seem curious that, in an almost feudal era, rich and fashionable Londoners should be so concerned to spare their employees the rigors of gear-shifting. But the motive wasn't so charitable as it appeared, as THE MOTOR hinted with their comment that "the ordinary paid driver makes a woeful hash of changing gear."

The 20 mph governor was omitted from the landaulette's specification. City streets provided no effective ambush for the stopwatch-and-waved-handkerchief speed traps operated in the country, so there wasn't the same incentive to be virtuous in town.

Royce's 1905 V8, if not oversquare in the 1960 RR/Bentley

fashion, was anyway square at 3¼ by 3¼ inches. It differed from its Elizabethan descendant, too, in having side valves rather than o.h.v. and two camshafts instead of one. The camshafts were at about the same level as the crank, and operated vertical valves through very long rocker arms and very short tappets. The banks of cylinders being 90 degrees apart, it follows the valves formed an angle of 45 degrees with the cylinder axis. Rolls-Royce, starting as they intended to go on, made no specific claim for power output, but THE MOTOR, by calculation, put it at "about 28 horsepower."



AUTOCAR, LONDON

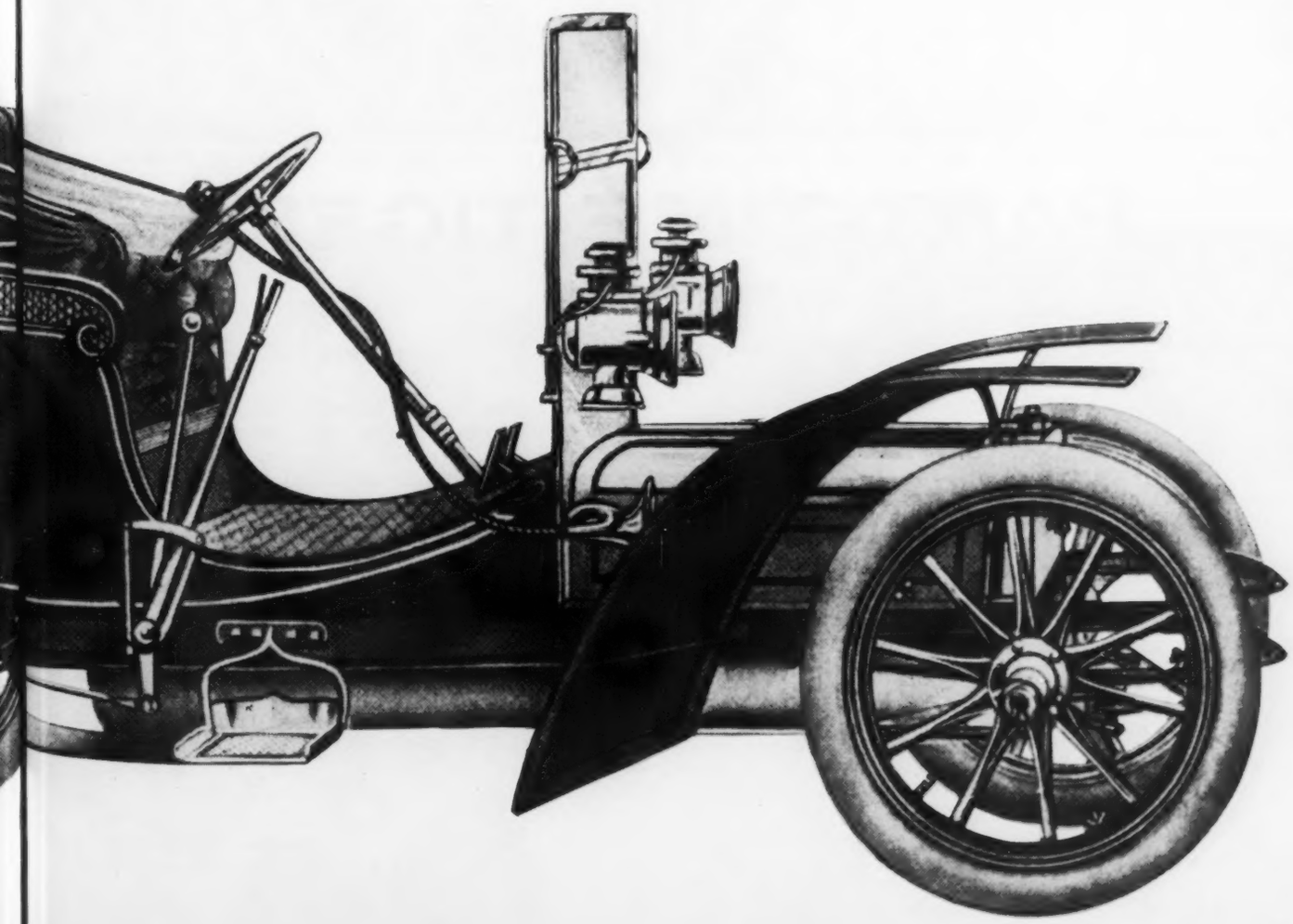
Royce went to this V configuration in an attempt to compete with the contemporary electric cars in silence and smoothness of operation.

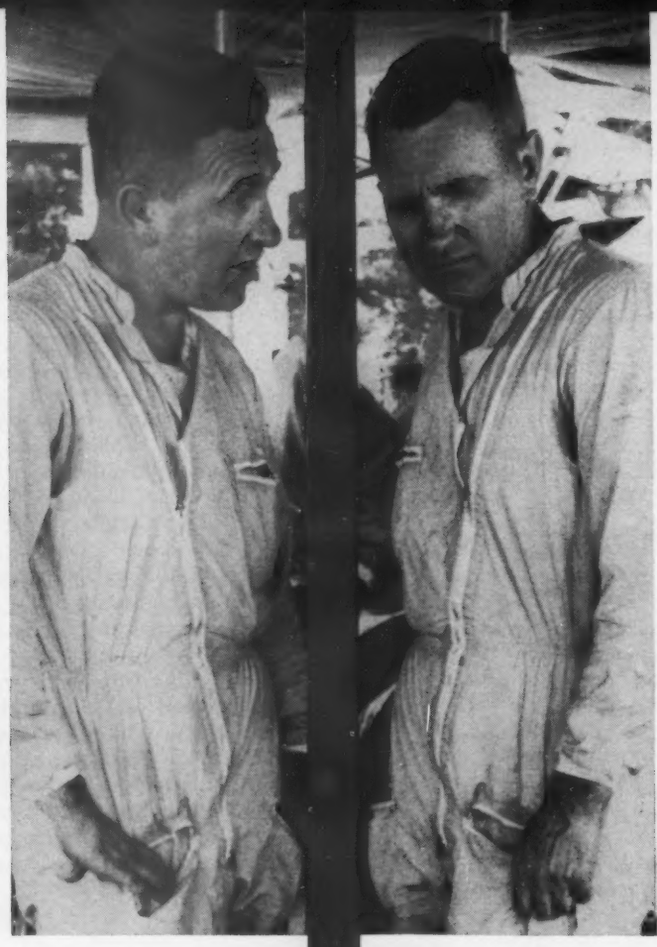
The combustion chambers were not far from hemispherical, though marred of course by an annex on the valve pocket side, and the pistons were convex. The spark plugs, one per cylinder, entered the heads horizontally. The cooling fan was mounted directly onto the crank nose. Close attention was paid to the design of the gear-driven oil pump, the object being to "flood the bearings without the pistons being overoiled." Malodor being the bugbear of the internal combustion engine, *vis-à-vis* the electric, Royce wasn't taking chances with a smelly exhaust.

There being no hood, the front axle lay behind the line of the almost vertical steering column. A horizontal shaft with pairs of bevels at either end transmitted the steering motion back from the base of the column to the axle plane, but no further detail of the geometry is deducible from the rather vague descriptions handed down to posterity.

Few Rolls V8s of the Edwardian vintage were sold, either as landaulettes or Legalimit three-seaters. Perhaps, after all, they smelled. Just a little, you know.

P.S. Rolls-Royce, in its long history, has built cars with two, three, four, six, eight and twelve cylinders. Would this be some sort of a record?





PHOTOGRAPHY: DOLIN

PART-TIME TIGER

by Steve McNamara

Relaxed Walt Hansgen has proved a snapping, clawing surprise package to drivers who cross him in a race.

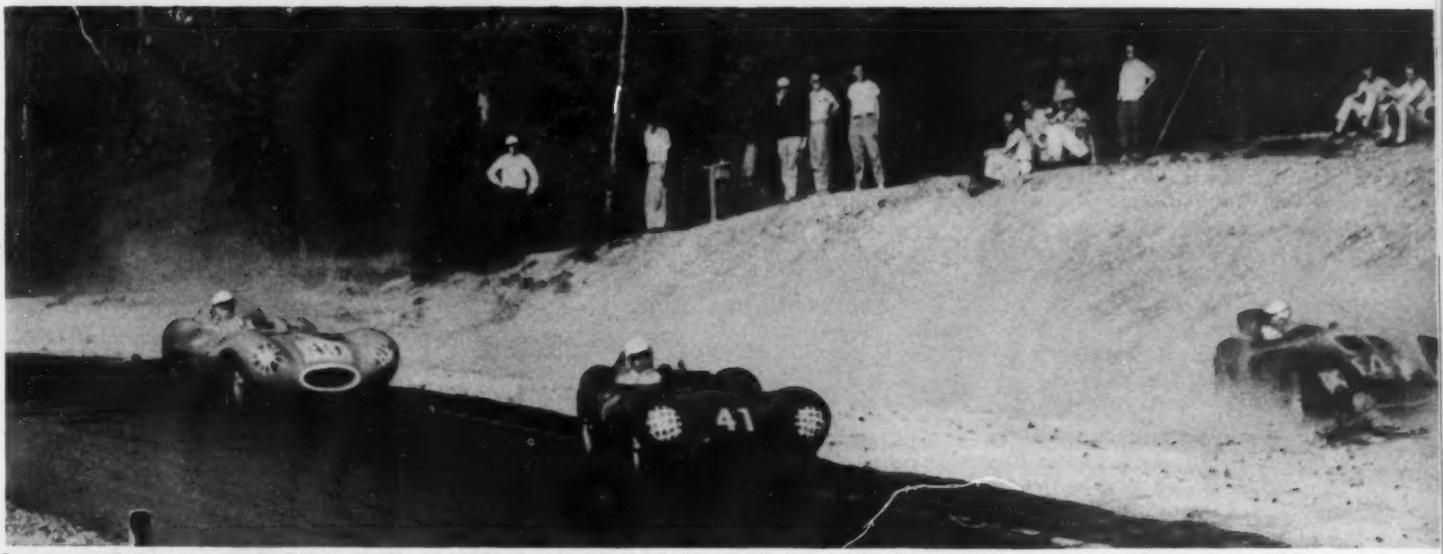
► It was the day of the elegant pre-race freeload at which the local gentry were to mix with the sports car racing world. "Going to the party?" a friend asked Walt Hansgen. "I don't know," said Hansgen, "Do you know if Mr. Momo got an invitation?" The friend didn't know. "If Mr. Momo didn't get an invitation," said Hansgen flatly, "I'm not going."

Even Mercedes in the heyday of Alfred Neubauer didn't demand or get this degree of team loyalty. The Cunningham team and manager Alfred Momo didn't demand it either, but they get it from Hansgen, the part-time tiger who is as much a team fixture as the huge van, Momo's jokes or the habit of winning. The Cunningham team is a team, not just a group of cars owned by one man, and as such it entails responsibilities, occasions when the plan of action may be not at all what the driver had in mind. It calls for a certain maturity, self-control, and ultimately, self-confidence. Hansgen is one of those fortunate drivers who has found his place in the sport and is happy with it; he isn't working off the frustrations of a dull job or trying to claw his way into the big time. Several drivers, some of them excellent, have toiled for Cunningham, but only Hansgen, 41, has become identified with the team, the Number One driver for America's Number One racing team.

Not surprisingly, Hansgen's personality is very much like the Cunningham corporate image: well-fed, successful, businesslike and with a devotion to motor sport that springs from something more than a longing for cash and conquest. And, as with the team, Hansgen's reserved, polite demeanor disguises a bristling desire for victory. In any group of drivers clustered on the grid before a race, smiling, gum-chewing Hansgen seems much less than grimly determined. Fellow drivers know better—"Walt's a nice fellow until you really press him in a race, cut him off or something," says a long-time opponent, "but then watch out. It's just like waving a red flag in front of a bull."

Hansgen cheerfully acknowledges his part-time tiger status, adding only that "You must use a certain amount of intelligence. You've got to realize here's something you can hurt yourself doing." Hansgen speaks from experience, most particularly as a result of a legendary weekend at Elkhart Lake in 1957 when three Cunningham D Jaguars were demolished, two of them by Hansgen. He came out of the Wisconsin woods with a concus- (*Continued on page 72*)

First race for Walt Hansgen provided this spirited action among three XK 120s at Bridgehampton in 1951. Hansgen in number 84 finished third in class.



Pressure applied by Hansgen in #41 causes Carroll Shelby to sift some sand through his Ferrari. Hot first-lap duel took place at Thompson in 1956.

Most of Walt Hansgen's competition career has been spent in Jaguars—from XK 120s to E-Types. This is the immaculate Auto Engineering production D.

STUDEBAKER Hawk

Since the winging Hawk's a full four-seater in the G.T. tradition, it should lure buyers who want both space and sport — made in the U.S.A.

► Studebaker-Packard's contribution to the American automotive industry's current ornithomania was hatched in 1953 with the then-revolutionary concept of a sleek, Raymond Loewy-designed, quasi-G.T. coupe. Since then the original Starliner has undergone annual name and plumage changes so that in its 1961 edition it no longer remains a fledgling but a fully flight-tested Hawk.

The Italianesque body, which was chosen for exhibit at New York's Museum of Modern Art when it was conceived, has withstood the rigors of time and facelifts and is still distinctively good looking. The engine-turned dashboard suggests the Cord as do the starkly functional, round, white-on-black instruments. A tachometer commands an imposing place, matching the speedometer right in front of the driver, but has no indicated redline. Hand controls for heater blowers, wipers, lights and such are convenient. The side ventilators are continued from earlier models and continue to rate a round of applause for their ability to provide cool, fresh air directly to the driver's or passenger's feet. The door-mounted ashtray on the driver's side is inconvenient to use, accessibility being blocked by the steering wheel. The flat floor enables owners to whisk out the small pebbles that seem to be standard equipment on every car without hurdling a door sill and the foot-operated windshield washer activates the wipers too when depressed fully. After a little familiarization you stop squirting the windshield when you want to dim the headlights.

The curiously-bent shift lever is handy and visibility all-around is good except for the slight blind spot caused by the larger-than-current-practice windshield posts. The Hawk was one of the few cars to resist the temptation to go to wrap-around windshields and thus is back in style today after others have abandoned them. Leg room is good, partly due to the squashed-circle steering wheel, and the pedals are placed for easy heel-and-toeing. The seats are attractive but we found them less comfortable than they look. The forward edge could use considerable inclination upward and the seat cushion needs more padding to achieve the bucket effect promised but not delivered by the shape. Rear seat room is more than enough for two, although legroom for the left-hand passenger diminishes sharply when the driver's seat is fully rearward. The latter could use another half-inch or so travel to satisfy long-legged chauffeurs. For those who yearn for features of the sports coupe of yesteryear in a modern guise, the Frank Hilker Studebaker dealership, 845 Halstead Street, Chicago Heights, Illinois has a solution. They are offering a "Bearcat Kit" to install a rumble seat in the Hawk or Studebaker Lark, priced at about $400.

Wide-swinging doors and the flat floor add convenience to the Hawk's distinctive styling and designed-for-driving cockpit and performance.

The automatic choke on the four-barrel carb speeds warm-up and an idle of about 800 is par. The clutch operates smoothly and without undue pressure, although as shifts are made at increasing revs, the pressure goes up proportionally. First gear engages without a murmur and thanks to the limited-slip rear end, near-full-bore starts can be made even on wet pavement or sand. The H-pattern of the four-speed, all-synchro box is not easily learned. More than one C/D tester found himself doing a lot of driving in neutral while attempting to sort out the gates. If the driver takes his time, the shifting is almost instinctive, but fast shifts give unpredictable results, surprising in view of the faultless performance of the same Borg-Warner box in the Corvette. A lock-out for reverse would be desirable, but is not essential.

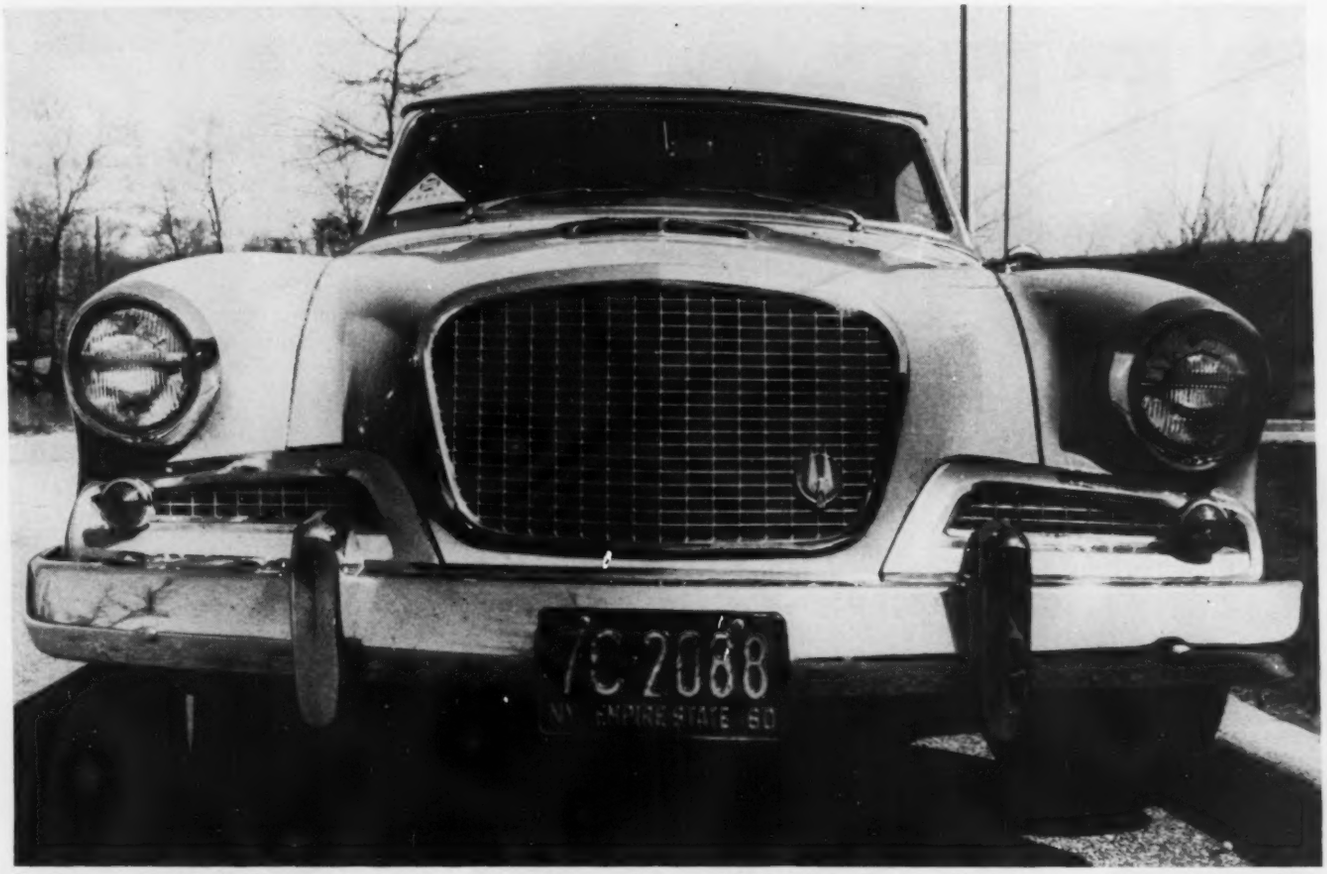
While the car we tested was undercoated we found the Hawk transferring considerable road noise into the cockpit. The testing, incidentally, included 4277 miles over a wide range of operating conditions. We found that steady pounding along at high speed caused the engine to require a quart of oil about every 500 miles although this appetite virtually disappeared after the odometer passed the 6600 mile mark; the car had about 3400 miles on it when we picked it up.

Kickback through the steering wheel on rough roads required the driver's attention although the power-assisted steering minimized effort. Around smoothly paved curves the Hawk fairly zoomed, its initial understeering tendency becoming more neutral as speeds increased. On rough, twisty back roads the car was still enjoyable to drive although corrections and the 4.6 turns lock-to-lock kept the driver's arms in a pinwheel of activity. Cruising at 70, 75, 80 or just about any speed you dare choose is effortless. Cross wind effects are negligible and cockpit ventilation is good without the car becoming a cave of winds.

The engine's torque and the choice of gears will satisfy even the most automatic-shift-oriented "driver." The engine will throttle down to a near idle in fourth and still pull away to over 110 mph in an inexorable whoosh. First-gear starts from a standstill will require skillful play of the clutch release and gas pedal as the cog is quite high; it will propel the car to almost 60 mph. For those who appreciate it, the power combination is well-suited to full-scale use. Even with such performance, economy doesn't suffer and is in fact very good for the kind of driving Hawks are intended for.

Pedal pressures are reduced considerably by the power-assisted brakes and stopping is quick although there is some loss of progressive brake application. An educated toe is advised for the best (that is, the least embarrassing) results. Hard braking causes the softly-sprung front end to dip considerably but control remains firmly in the driver's hands.

The Hawk, a pacesetter in the American industry's trend toward grand touring cars, held tremendous promise when it was introduced. For a while it appeared as if it was matching in the G.T. field Corvette's progress in the American sports car endeavor. The Hawk had all the potential of becoming an excellent and genuine G.T. machine, but it was never fully exploited. Perhaps what was lacking was the S-P equivalent of Corvette's secret ingredient, Duntov. It's still not too late for the Hawk to fulfill its stated role as "the first American car in the true G.T. tradition . . ." As it stands it's extremely capable—and strong competition for the new bucket-seated upstarts in its field. —*C/D*



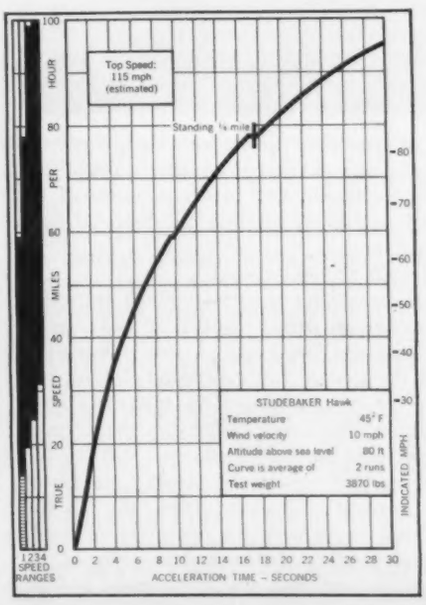
The "air scoop" on the hood may not be functional, but everything else below and behind it is. The basic Hawk body was first introduced in 1953.

ROAD TEST

STUDEBAKER Hawk

Price as tested: $3384.98 ($2650 basic)

Manufacturer: Studebaker-Packard Corp.
South Bend 27, Indiana


Top Speed: 115 mph (estimated)
Standing ¼-mile
STUDEBAKER Hawk
Temperature 45° F
Wind velocity 10 mph
Altitude above sea level 80 ft
Curve is average of 2 runs
Test weight 3870 lbs
TRUE SPEED MILES PER HOUR
INDICATED MPH
1 2 3 4 SPEED RANGES
ACCELERATION TIME – SECONDS
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
0 20 40 60 80 100
30 40 50 60 70 80

ENGINE:

Displacement	289 cu in, 4737 cc
Dimensions	Eight cyl, 3.56 in bore, 3.63 in stroke
Valve gear	Pushrod in-line overhead valves
Compresion ratio	8.8 to one
Power (SAE)	225 bhp @ 4500 rpm
Torque	305 lb-ft @ 3000 rpm
Usable range of engine speeds	900-5300 rpm
Corrected piston speed @ 4500 rpm	2690 fpm
Fuel recommended	Regular
Mileage	14-21 mpg
Range on 18-gallon tank	250-380 miles

CHASSIS:

Wheelbase	120.5 in
Tread	F 57.4, R 56.6 in
Length	204.0 in
Ground clearance	6.9 in
Suspension: F, ind., coil, wishbones, anti-roll bar; R, rigid axle, asymmetrical leaf springs.	
Turns, lock to lock	4.6
Turning circle diameter between curbs	41 ft
Tire and rim size	6.70 x 15, 15 x 4½K
Pressures recommended	F 24, R 20 psi; 30 psi for high speeds
Brakes; type, swept area	F 11, R 10 in drums; 281 sq in
Curb weight (full tank)	3620 lbs
Percentage on driving wheels	46%

DRIVE TRAIN:

Gear	Synchro?	Ratio	Step	Overall	Mph per 1000 rpm
Rev	No	2.26		7.48	—10.8
1st	Yes	2.20	33%	7.28	11.1
2nd	Yes	1.66	27%	5.49	14.7
3rd	Yes	1.31	31%	4.33	18.7
4th	Yes	1.00		3.31	24.4

Final Drive Ratios: 3.31 to one std., 3.07, 3.54 optional.

DEFROSTING YOUR SAAB

Hailing from the frozen North, Sweden's Saab readily responds to the hotting-up methods Alex Walordy describes here. His general discussion of two-stroke tuning applies to most other popcorn-poppers too.

Port grinding on a 93 block is handled here by Saabophile Tom Corcoran. Goal here is slicker surface without drastic changes in port shape.

Careful checking of port widths is advised to avoid size differences and curve changes that lead to poor distribution and rough running.

Final porting touch is squaring of corners by hand. Make height changes only in accord with figures presented in tuning table on page 61.

► Most Saab owners are content to bask in the reflected glories of race and rally victories earned by their marque. Some turn to action by purchasing a GT, while others talk of souping their engine. It is for this latter group of prospective field engineers that we have compiled a guide to perdition especially designed to ease the transition from the talking to the doing stage. Vital statistics on benefits gained in souping a Saab are impressive to say the least. A comparison between two Saab engines, both of 748 cc displacement, shows that the stock 93B pulls 38 bhp at 5000, while the GT develops 50 bhp at the same rpm. To go still further, 57 bhp and up have been coaxed out of this same mill in full racing trim, though admittedly it's of little street use at that stage of development.

The 27 percent power gain exhibited by the GT over its more sedate brother indicates an impressive potential when extrapolated to Saab's latest arrival, an 841 cc engine of similar design that powers the "95" and "96" models. Since a GT version of this new engine is not available at the present, the prospect of brushing up on soup-up procedures becomes all the more alluring. Rather than offer a cook book recipe for extra power, we would like to review some of the whys and wherefores of two-stroke engines, in the fond hope of preventing costly mistakes.

THE TWO-STROKE CYCLE

To eliminate valves, cams, and their attendant complications, the two-stroker relies on piston control of ports opening into the cylinder and the crankcase. Action takes place both above and below the piston. Let's see what develops on the underside first: as the piston moves up it creates additional crankcase volume; its lower edge uncovers ports leading from the carburetor to the crankcase, and air-fuel mixture flows in. During the downward stroke, the piston closes the crankcase porting and compresses the air-fuel mixture (this has nothing to do with the compression stroke of four-stroke engines). Further downward motion of the piston uncovers a transfer port and the compressed air-fuel mixture blows from the crankcase into the cylinder, sweeping

out before it the exhaust gases from the previous power stroke.

Upward motion of the piston closes both the transfer and the exhaust ports, causing the mixture to be compressed. Toward the end of the compression stroke the mixture is ignited and then burns, as in a conventional four-stroke engine. As the piston travels down again, the exhaust ports are the first to open, to relieve the pressure within the cylinder. The transfer ports open a fraction of an inch later, the new fresh charge sweeps into the cylinder, and the cycle begins all over again.

PORTING A COMPROMISE

The built-in problem of two-stroke engines is to keep the incoming air-fuel mixture from heading out through the exhaust ports, or mixing excessively with the exhaust gases. Some two-strokes rely on piston baffles, or tricky dual cylinder arrangements, while the Saab uses the Schnurle principle, a loop-type flow pattern through the cylinder imparted by the directional action of the ports. Unavoidably there is some overlap and mixing, but this occurs even in a four-stroke engine, and varies with timing characteristics and engine speed.

At low engine speeds the dilution of the incoming mixture by exhaust gases increases, for very little fresh charge is admitted. This results in the familiar four- and six-stroking at idle, where a cylinder skips several beats until combustion takes place, and then skips again. Higher speeds bring out a more distinct flow pattern, less exhaust dilution, and more efficient operation.

Porting and timing are a matter of delicate compromise. Generally, horsepower gains at higher rpm are balanced out by torque losses at the lower end. The final result of your modifications can be any desired shade between a moderate engine, tractable in traffic, and a racing unit designed for a high-speed road course, such as Saab's latest experiments with a Formula Junior.

IMPRESSIVE PRECISION CONSTRUCTION

Tearing into the Saab engine, in quest for possible modifi-

cations, we find an aluminum head with dome-shaped combustion chambers and centrally-located spark plugs. Nominal compression ratio is 7.3 to one on the 93B, and 9.8 to one on the GT. To accommodate the domed Saab pistons wider bevels are used on the GT combustion chambers than on the 93B. GT heads also have a more generous water outlet.

The block is a model of precision in which ports leading into the cylinder are not allowed height variations exceeding 0.5 millimeter (0.020 inch). To insure maximum rigidity and good crankshaft support, the cast-iron crankcase and block are machined jointly, and line-bored as an assembly. Neither part is replaceable separately in service. The crankcase conforms fairly closely to the volume generated by the crankshaft, and the individual crank chambers are separated by ring-type seals. A dual-lipped seal, designed to resist alternate pressure and vacuum, and a grease-packed distributor drive are located at the front of the block.

The crankshaft is made up of six identical discs used in pairs and interconnected by rod and main bearing journals, with ball bearings at the mains and dual rows of rollers at the rods. During assembly, rods and their journals are gauged on a machine that automatically selects the correct roller size for minimum clearance. Woodruff keys insure the correct relationship between the flange plates and journals. The crank is assembled on a press, a section at a time, while supported on a special jig, and is fitted so closely that cranks have been run successfully, on an experimental basis, without benefit of the keyways. A special stand with banks of dial indicators is used in trueing the assembly. The rod and crank group, replaceable only as a unit, is virtually indestructible as long as gas station attendants don't neglect to add oil to the gas tank, or spear empty cans for fast profits.

FITTING THE PISTONS

The 748 and 841 cc engines have the same crank assemblies, the only difference being a 66 mm bore on one and a 70 mm bore on the other, i.e. a change in pistons and block. Pistons made in '57 and the first half of '58 are lighter, while later models are heavier, with a cast-iron ring for expansion control, and must not be replaced or interchanged singly. GT pistons have been redesigned under the crown to prevent burn-through under the combined impact of a GT kit and competition conditions. Unfortunately they are not, as yet, available in 850 GT Form as an off-the-shelf item.

Stock piston clearance is 0.0025 inch, measured across the thrust diameter. That of GT pistons is 0.003 to 0.0035, considering that the noise factor is negligible and expansion is greater. Pistons come in a variety of gradings, both in standard and in 0.040 oversize. Normal practice is to acquire the pistons first and then hone the cylinders to match, rather than the other way around. Ring gaps are kept at 0.012 inch for both standard and competition conditions. Final assembly of the engine is effected by turning the block upside down and installing the crank, rods and pistons as a unit. The lower end of the cylinder is beveled to guide the rings, but considerable care is needed to avoid ring breakage.

INCREASING THE COMPRESSION

Two-stroke engine modifications take three general forms: higher compression ratio for the combustion chamber, higher crankcase compression, and improved breathing. Higher compression ratios produce greater combustion efficiency but are limited by the onset of knock, especially at part load. As wilder port timing reduces low-speed torque and the corresponding mean effective pressure in the cylinder, higher compression ratios become possible. For instance the use of a GT cylinder head and crank in a 93B engine of the same displacement results in a low-speed knock tendency. In the GT engine, with considerably longer port durations, this problem does not occur! This just goes to show that an engine is a complete entity in which you cannot change one component without affecting others.

The compression ratios quoted for Saabs are nominal, being based on piston displacement, and do not take into account the height of the ports. On the 93B, compression is raised by installing a GT cylinder head. On the 96, compression is raised to approximately 9.5 to one by milling 4 millimeters (0.157 inch) from the cylinder head. Stage three pushes its luck a little further by shaving 4.5 millimeters (0.177 inch) and probably invites burning holes in the pistons. In either event, a relief for piston clearance must be provided, and combustion chamber volumes have to be equalized.

Crankcase compression increases are a double-edged sword. On the plus side, a reduction of free crankcase volume (increasing crankcase compression) insures a faster transfer of air-fuel mixture into the cylinder, and produces greater entry velocity. As a result exhaust gases are scavenged more efficiently and cylinder filling improves. On the other hand, low-rpm torque suffers to some extent, for the sweep may become *too* efficient, causing part of the air-fuel charge to stream out through the exhaust ports. Crankcase compression is increased in the GT by a special crankshaft. The deeply-cut-out flange discs of the stock crank are replaced by almost-full discs with two small pinched sections that assist balance and also provide additional space for gas passage. No, they should not be filled! Can you picture what fiberglass will do, flying out at peripheral crank speeds?

CHANGES IN PORT HEIGHT

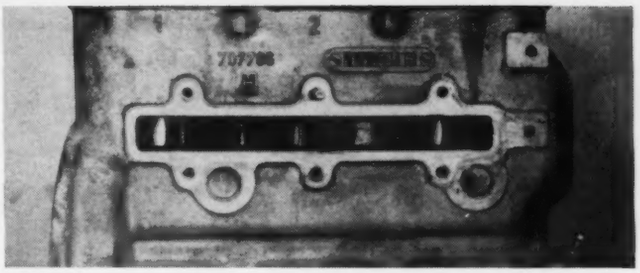
Intake into the crankcase is controlled by the lower edge of the piston. Raising this port is virtually useless, as its upper portion remains unmasked for only a short duration while the piston is at top dead center. Lowering it has an appreciable effect, for the lower section remains open for a considerable duration. When the engine is running fairly slowly the piston, in descending from the top dead center, pushes some of the air-fuel mixture trapped in the crankcase back out through the inlet port; hence a direct loss in low-end torque results if the timing is too wild. On the other hand, at higher speeds the column of air-fuel mixture from the carburetor through the ports flows at increased velocity, and continues to fill the crankcase by intertia ramming even though the piston has started down. This ram effect results in "free" supercharging, and a distinct gain in torque and horsepower.

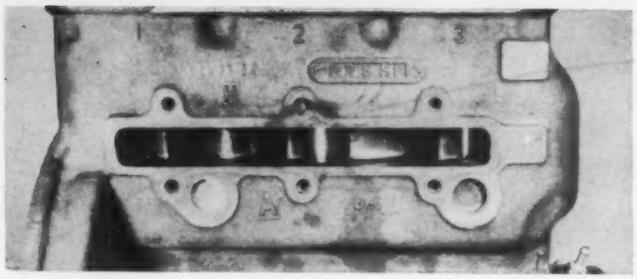
The engine derives its power from the expansion of high-pressure gases during the power stroke. At low rpm, the greater the expansion ratio is, the more efficient the engine is and the better the torque. For low-end output a lower exhaust port is beneficial since the top of the piston will take longer to unmask it. On the other hand the exhaust port must open to relieve cylinder pressure before the transfer port opens, otherwise exhaust pressure will blow down into the transfer port, contaminating the incoming air-fuel mixture. The more we lower the exhaust port, the less time there will be to scavenge the cylinder and fill it with fresh air-fuel mixture. Hence, for high rpm performance the exhaust ports are raised, causing a corresponding loss of low-end torque. There would be little point in lowering the exhaust ports to gain added area, for their bottom edge coincides with the piston crown's position at bottom dead center.

The twin transfer ports into each cylinder also have their bottom edge at bottom dead center, hence there's no need to rework them at that point. The upper edge controls the beginning and end of the intake into the cylinder. Its height is dependent, in a great measure, on the relative height of the exhaust port, to insure a sufficient drop in exhaust pressure before the intake opens. Raising the transfer port does achieve a greater duration of filling for the cylinders, but its effect is felt mostly at higher rpm.

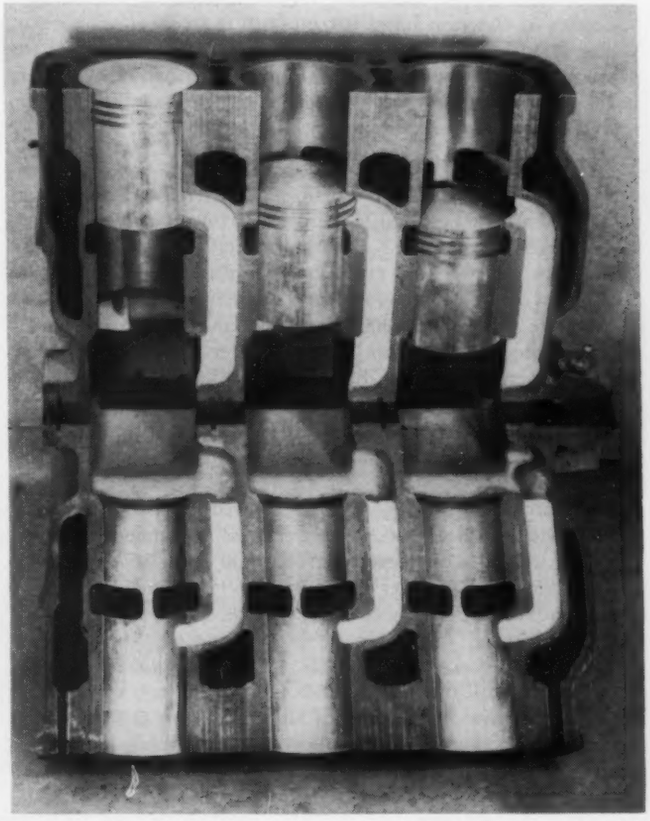
MECHANICS OF PORT ENLARGEMENT

Port width increases are generally (*Continued overleaf*)

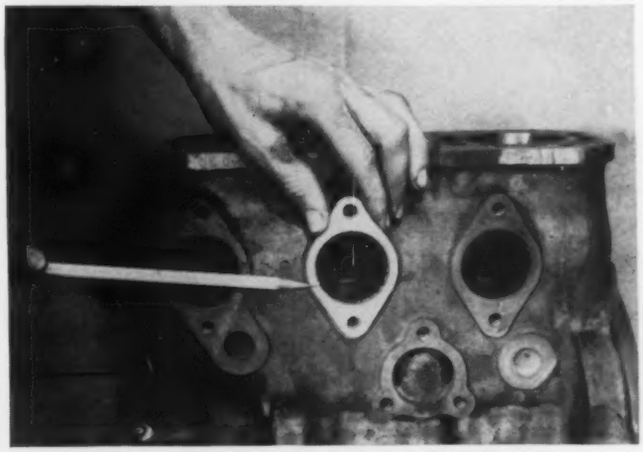




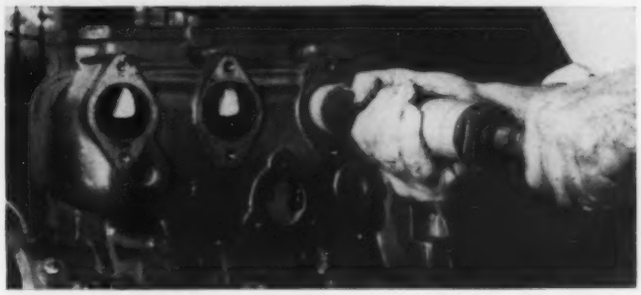
This isn't a before-and-after sequence, but it does show the importance of porting the Saab. At left is the stock port, a thin, dark cave of rough surfaces that's still highly refined in shape; at right are the wide, gleaming tonsils of a GT block that's had the benefit of some extra attention.

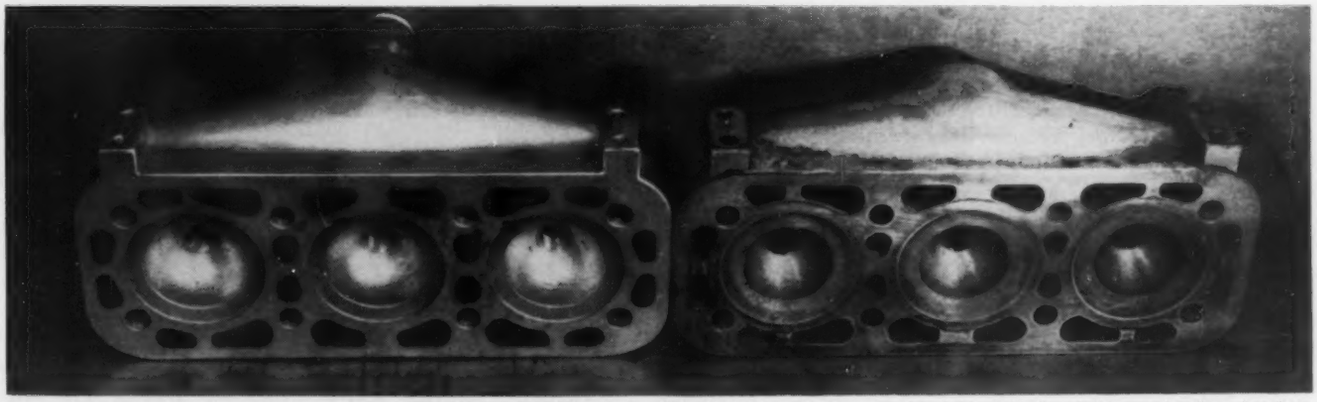


General porting layout is shown on this bandsawed block. Hard-to-polish transfer ports are painted white; intake ports are in the lower section.



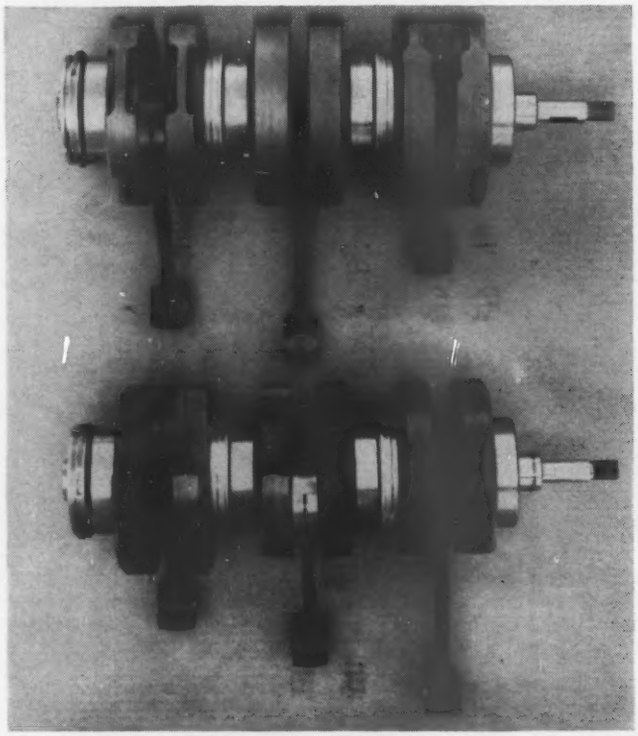
Stock exhaust ports are slightly under maximum possible size, as shown by comparison with gasket above. Grinder is used, as below, to bring out to manifold diameter. Though not part of this tuning story, Fisher Products has a new Abarth muffler kit for all Saabs, selling for $59.50.





Owners of the Saab 96 are denied a luxury available to 93B drivers: the GT cylinder head shown on the right. Added metal in combustion chambers increases the nominal compression ratio, a change that can only be effected on the 96 by milling the head and relieving the chambers for clearance.

Stock distributor has much longer, heavier breaker point arm than the special GT distributor, whose abbreviated point assembly is shown separately.



GT crank at top has fuller counterweights than stock assembly to raise crankcase compression, but shouldn't be used without GT porting also.

beneficial throughout the rpm range. Before putting your grinder to work with renewed vigor, keep in mind that the port dividers are there to contain the rings and prevent them from catching on the port edges. Remove the dividers, and presto — no rings. All ports must be chamfered, particularly the exhaust port, to prevent them from expanding and catching a piston ring. This applies whether you are porting an engine or have simply honed or bored the cylinders. Do keep in mind that a large chamfer will alter the effective opening time of the port.

The corners of the port openings can be brought out sharper than the ones on the casting, for a gain in area. Thinning out the dividers also results in area increases. The directions of the ports must never be changed, under any circumstances, for they are carefully calculated to produce the correct gas flow pattern within the cylinder during scavenging.

Very little can be done with polishing the inside of the transfer ports because of their inaccessible configuration. Three of them start out from a recess in the main bearing web. Saab's bulletin on GT modifications suggests that these ports be polished "as well as can be," a masterpiece of understatement. Exhaust ports can be brought out to manifold gasket size; both exhausts and intakes can also be polished to your heart's content.

As a one-millimeter change in port height can mean a great deal to timing, starting the work by hacking away with a file is a path to certain disaster. Instead, apply blueing to the cylinder walls, and scribe horizontal circles on the cylinder at the correct port heights given in the adjoining table.

OTHER HIGH-SPEED NEEDS

If your engine is tuned for high rpm, several other modifications must be carried out to match its new characteristics. A crankshaft vibration damper with a larger hub, especially made for the GT, is used in conjunction with a matching front seal and cover. The spring retainer cup at the vibration damper is exchanged for one that has a considerably heavier lip. High rpm also bring generator problems. A stock one would simply turn too fast and burst, so its drive pulley is changed to a larger one, reducing the speed of the armature.

The silencer section of the air cleaner is provided with a short internal pipe tuned so that the incoming air column resonates at the rpm band corresponding to the peak torque. When modifications have been carried out, changing the peak torque range, that pipe must be removed by cutting it off at the base. If you wish, the entire assembly can be replaced with the free-breathing GT air cleaner.

IGNITION IS SENSITIVE

Two-strokes abound in ignition peculiarities which must be catered to for best results. Since distributor drive — unlike that of the four-stroker — is at crankshaft speed, all timing indications are given in crankshaft degrees and must *not* be divided by two! A standard coil (Bosch TK1Z A3 or A4) is tested to produce 16,000 sparks per minute, throwing an uninterrupted arc across a 10 millimeter gap (0.394 inch). The replacement Bosch TK12 A10 coil, which should be used on GT modified engines, produces up to 18,000 sparks per minute under the same conditions. This coil requires a separately-mounted external resistor matched to it (Bosch ZWJ 11Z4Z).

The distributor should be replaced with a Bosch VJ3 BR7 unit, timed at top dead center. Initial advance begins at 400 rpm, reaching 5 degrees at 700-1000 rpm, 10 degrees at 900 to 1250 rpm, 15 degrees between 1150 and 1500 rpm, and the advance peaks between 1500 and 2000 rpm, reaching 18 to 22 degrees. This is in direct contrast to the stock distributors that do not reach this advance — plus the initial 8-12 degrees — till five or six thousand rpm. The explanation is simple: at low rpm the wild timing of the GT and low compression pressures call for more advance, while at higher rpm the better breathing of the engine calls for less maximum advance. Saab recommends the use of a timing light at 3000 rpm to set the advance.

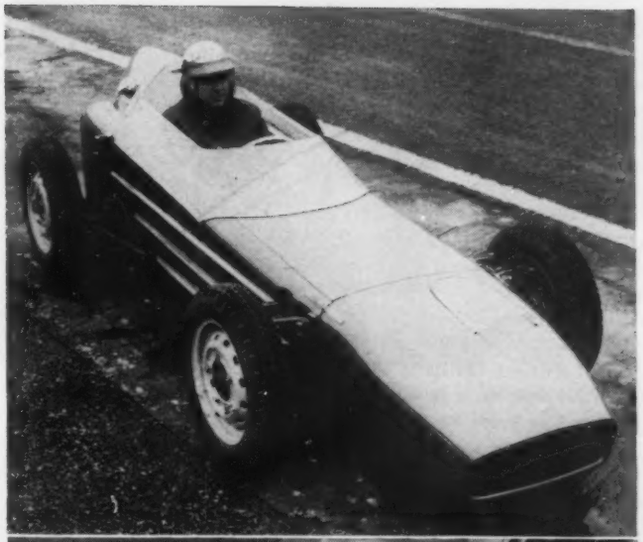
The stock Saab is equipped with auxiliary-gap spark plugs. The auxiliary gap, incorporated in the center electrode, prevents a voltage leak down through a fouled spark plug, though when the spark can cross the auxiliary gap it is also strong enough to cross the gap between the electrodes and insure ignition. One common owner fault is driving too slowly and gently in town, lugging the engine and fouling the plugs. The friendly garage man installs the next-hottest plugs, which are promptly burned out during the next high-speed turnpike trip. For competition, three plug types are suggested:

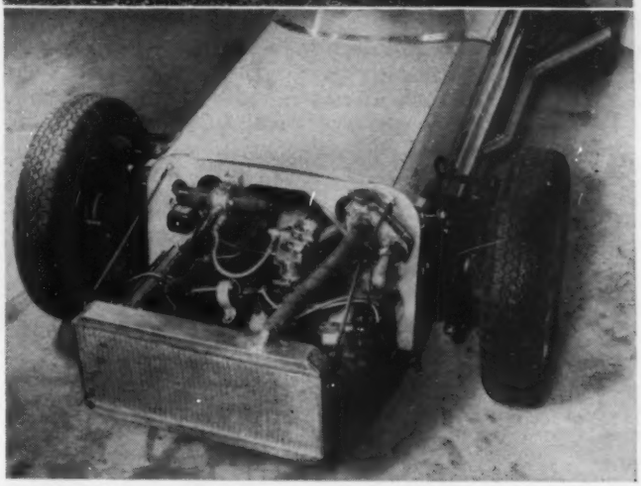
Bosch M225T1 with the standard engine and a 0.020 gap.
Bosch M240 T1 with the GT 750, the single-barrel carb, and a 0.020 gap.
Bosch DM250 T1 with the GT 750, the tuning kit, and a 0.016 gap.

Note that best idling is achieved with a large gap, the smaller gaps being imposed by high-speed firing requirements. Too large a spark plug gap often causes arcing at the distributor cap. Once a carbon path or a crack forms, just changing the plug will not cure the trouble. The cap must also be replaced, and sanding or scraping it will not help. The latest distributor caps are made of material which

SAAB TUNING SPECIFICATIONS

GROUP ONE	748 cc Engine	841 cc Engine
Venturi	31 mm	28 mm
Main jet	150-155	150-155
Air correction jet	240-250	250
Idle fuel jet	45	45
Idle air jet	140	100
GROUP TWO		
Cylinder head	No change	Mill head 4 mm, which raises compression ratio to 9.5 to one. Rework chambers to accommodate piston crowns.
Exhaust port	Raise 2 mm, polish	Raise to 47 mm, polish
Intake port	Lower 1 mm, polish	Lower to 96 mm, polish
Transfer port	Polish only	Raise to 57 mm, polish
(Except for 748 cc engine, distances are given from top of block.)		
Venturi	31 mm, polish	31 mm, polish
Main jet	150-155	150-155
Idle fuel jet	50	45-50
Air cleaner	Change as described in text.	
Ignition coil	Bosch TK12 A10	
GROUP THREE		
Cylinder head	Fit GT head	Mill head 4.5 mm. Rework chambers to accommodate piston crowns.
Exhaust port	Raise to 46.7 mm, polish	Raise to 46 mm, polish
Intake port	Lower to 97.3 mm, polish	Lower to 97 mm, polish
Transfer port	Raise to 56.8 mm, polish	Raise to 56 mm, polish
(All distances are given from top of block.)		
Crankshaft	Fit GT crankshaft	
Carburetor	Two-barrel Solex 44PII	
Fuel system	Fit two fuel pumps in parallel	
Exhaust	Fit special exhaust system	
Distributor	Bosch VJ3 BR7	
Coil	Bosch TK12 A10	





World's quickest Saab is factory's experimental Junior. Stock-sized Type 96 engine is tuned to nearly 70 bhp with twin-throat Solex, while tension coil springs carry front-wheel loads to steel monocoque body.

is less sensitive to arcing. The curtain at the grille is very helpful in keeping rain away from the front-mounted distributor; raise it when you turn on the wipers, even though the distributor has a small sheet-metal protector in front of it.

COOLING AND CARBURETION

Cooling is affected but little by the curtain, for the radiator is mounted at the rear of the engine and has an ample air supply through portholes in the interior fender sheet metal. In the winter the portholes can be shut off partially or altogether. Swedish winters being what they are, a removable connection supplies exhaust-heated air to the carbs. This isn't likely to increase power, but is excellent for combating carburetor icing and the excessively rich plug-fouling mixtures that can result. In the summer a worthwhile lowering of coolant temperature results from draining the antifreeze, even if the can did say it was permanent.

We have really saved the best for last: carburetion. The stock Solex 40 A1 is reworked to use, among other things, a venturi three millimeters larger. Detailed jetting specs are tabulated separately. On the theory that if a little is good a lot must be even better, modifiers like to avail themselves of a two-barrel Solex 44 PII. However, the engine thrives on this installation only when rpm exceed the 3500 to 4000 mark. In other words if you want a racing engine, you should drive accordingly: four-speed box preferred. Also mandatory with the two-barrel Solex is the tuned muffler and exhaust system. One will just not work without the other. The tuned exhaust is, to put it mildly, noisy enough to warrant a ticket, which brings us to the conclusion that a single-barrel Solex is ample for street use. When going all-out it's advisable to install a pair of fuel pumps connected in parallel.

A GT engine conversion does impose an additional hardship on the clutch, so a conversion to the GT assembly is essential. The friction material is different. You can recognize it visually by the wire thread interspersed through the facings. A stronger pressure plate is also used.

FINAL REMINDERS

Unless you're willing to do without your Saab during the time it takes to carry out this project, you can purchase a block and perform all modifications in the comfort of your garage, switching engines when you're ready. People in the know, with special ideas on how porting should be carried out, prefer the purchase of a stock block rather than a GT for this leaves them additional room and metal when carving out a port design. The GT head and crank are excellent investments, but should never be used in a stock engine as simple bolt-on equipment. As we said earlier, they are designed for use only in conjuction with porting modifications.

With all of this information at hand, you're all set to start on "Project Saab." What could be sweeter than the purr of an engine *you* modified or that cushioned pressure in the small of your back when stepping on the accelerator of a fast Saab? —*AW*

Monte Carlo is a personal triumph for Stirling Moss and Lotus against Ferrari's might.

Moss Again!

by Jan Norbye

► The opening round in the 1961 World Championship for drivers held great expectations and proved to be the most memorable Monaco since 1933 when Achille Varzi won for Bugatti at an average speed of 57 mph after a race-long duel with Nuvolari, passing and repassing on this extremely tight circuit until Nuvolari's Alfa Romeo blew up on the 99th lap.

The 1961 race went to Stirling Moss who led from the 14th lap to the finish while the Ferraris of Richie Ginther and Phil Hill snarled at his heels. For Moss, driving a 1960 Lotus ownd by R.R.C. Walker, it was another of his Grand Prix victories snatched from factory teams. Walker's Pippbrook Garage, by thorough preparation and clever strategy not to mention brilliant driving, has been doing this since Moss's surprise win in the 1958 Argentine Grand Prix with a 1750 cc Cooper.

Moss's winning margin this time was only 3.6 seconds after 100 laps of grueling racing in the hilly and tortuous streets of Monte Carlo. Both the winner and runner-up Ginther came within one-tenth of a second of the 1:36.2 lap record set by Bruce McLaren in a Cooper last year. The race average, which kept rising throughout the event except for a brief period when approaching half-distance, beat all previous Monte Carlo performances. Last year Moss won with an average of 67.3 mph in a 2.5-liter Lotus; this year it was 70.66 mph with a 1.5-liter car. A hint of things to come was given during the last practice session when Moss secured the pole position with a lap at 1:39.1 after the Ginther and Hill Ferraris had dominated previous trials with laps of 1:39.3 and 1:39.8 respectively.

The three Ferraris were equipped with long snouts, reminiscent of the Sacha Gordine (widely publicized in 1952 but never raced) which, with the long megaphone tailpipes, made them by far the longest cars on the course. This hardly seemed logical, as compactness has been known to pay on this very twisty circuit. Mercedes-Benz produced a special short-wheelbase version of the W196 in 1955 and Vanwall had shortened front air intakes in 1957 and 1958 as did Ferrari later. In the Station hairpin, for instance, the new Ferraris had very little room to spare, especially in front. One car, Ginther's, had the latest V6-120° engine, said to develop 190 bhp at 9500 rpm on a 9.8 to one compression ratio. The cars of Hill and von Trips had the 180-bhp V6-60° engine.

During the winter Colin Chapman had obviously put a lot of work into the Lotus chassis as the Team Lotus cars of Innes Ireland and Jim Clark were developed considerably over last year's model as still raced *(Continued overleaf)*

Vivid, violent, lurid in their raucous redness, the new Ferraris are a tribute to the framers of the new Formula. Above is Ginther in the sole car with the 120-degree-vee engine; below is Phil Hill propelled by the 65-degree unit. The engine differences force frame and air intake alterations.

Ex-cyclist Surtees appears bemused by the intricacies of the Monte Carlo track. His Yeoman Credit Cooper blew its engine when he was in fifth place.

Graham Hill sits for a pre-race portrait assisted by von Trips and Joe Bonnier and accompanied by Bette Hill, at left, and Marianne Bonnier.

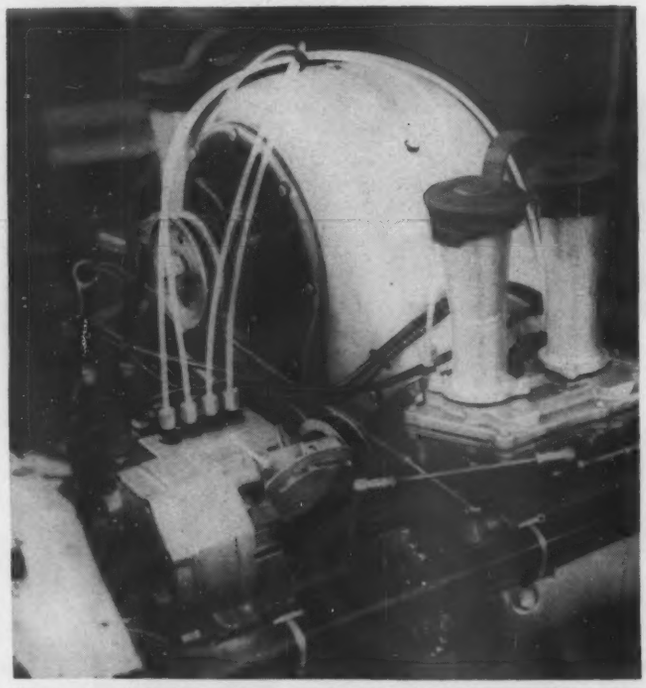
XIX GRAND PRIX DE MONACO

Monte Carlo, May 14, 1961

100 laps, 1.98 miles per lap

1	Moss	Lotus-Climax	2:45:50.1 70.66 mph
2	Ginther	Ferrari	2:45:53.7
3	P. Hill	Ferrari	2:46:31.4
4	von Trips	Ferrari	2 laps behind
5	Gurney	Porsche	2 laps behind
6	McLaren	Cooper-Climax	5 laps behind
7	Trintignant	Cooper-Climax	5 laps behind
8	Allison	Lotus-Climax	7 laps behind
9	Herrmann	Porsche	9 laps behind
10	Clark	Lotus-Climax	11 laps behind

Fastest Lap: Moss (Lotus), Ginther (Ferrari), 1:36.3 (71.1 mph)



This is Porsche's low-pressure port-type injection system; with its belt drive and mechanical control it's a development of that tried on pushrod engines last year. Post-race checking showed Bonnier's retirement was caused by faulty fuel tank baffling which allowed air into the system.

by Rob Walker. Both the front and rear suspensions were all new. The front wishbones were longer, the pivot points being well inside the body, as were the spring/shock absorber units. At the rear end the roll center had been lowered, thus leveling off the roll axis of the car and visibly improving cornering stability. The engines were the latest Coventry Climax units, also used by Cooper and B.R.M. The swept volume has been increased from 1475 to 1498 cc by boring out the cylinders 0.02 inch. Maximum power has been increased by about 6 bhp, but in the 5000 to 7000 rpm range power is up by 8 to 10 bhp. The tilt of the engine has been increased from 18 to 20 degrees in the Lotus.

On the first day of practice Jim Clark put in a lap at 1:39.6 before crashing and reducing the car to what seemed a complete write-off. By having new parts airlifted from England and working night and day, it was reconstructed in time for the race. Bad luck also befell Innes Ireland. His car started the first practice with a four-speed gearbox and he did a lap in 1:41.5. A five-speed box was installed overnight and allowed Ireland to reduce his time by a full second. The shifting must have been tricky, for Ireland spun around once, missing a shift, on Friday. In Saturday's practice the same thing happened as he was coming out of the tunnel. The car crashed and Ireland was hospitalized with leg injuries.

Porsche fielded three cars for Bonnier, Gurney and Herrmann, all with four-cylinder fuel-injected engines. Bonnier's and Herrmann's cars also had the new wishbone-front-suspension chassis while Gurney's retained the old trailing-link type. Drum brakes were used on all three. The fuel injection did not raise the maximum power – the engine develops 160 bhp – but raised torque considerably in the lower rpm ranges. Both Bonnier and Gurney said acceleration was improved. During practice there was a lot of transmission switching going on and for the race Bonnier had a four-speed while Gurney and Herrmann had five-speed units.

The B.R.M. team consisted of Tony Brooks and Graham Hill, with cars improved considerably over last year's models. Dunlop disc brakes are now used at all four wheels and the tail-end transmission brake has been discarded. Coventry Climax engines are being used until the B.R.M. V8 is ready to race. Graham Hill equaled Jim Clark's practice time but Clark, having got in first, started in the front row, while Graham Hill made up the second row with Phil Hill's Ferrari.

Following two Championship years Cooper could do no better than the third row, represented by Bruce McLaren. Brabham took part only in the first practice session achieving 1:44.0 and was allotted the last position on the grid. The Monaco event occurred during the time Brabham was "commuting" by jet to the United States to qualify for the Indianapolis 500, which he did with a very convincing average of 145.144 mph. He arrived in Monaco just in time for the Grand Prix.

The Maserati-engined Emerysons of the Ecurie Nationale Belge weren't fast enough to qualify and Gendebien's car sounded particularly rough. Another non-qualifier was Masten Gregory in the Camoradi Cooper. This was unfortunate for Gregory was right on form, driving in a highly polished manner and making it look very easy, but the car didn't have the speed required to put him on the grid.

Sunday morning was bright and warm, but by noon the sky was overcast and the risk of overheating was consequently reduced somewhat. Still most competitors chose to run with the engine side panels removed. Race director Louis Chiron briefed the drivers before the start, stressing the dangerous nature of the circuit and making a plea for traffic safety.

At the fall of the flag Brooks made his way up from the third row and tied with Moss to the Gasworks hairpin. Richie Ginther was out in front of Jim Clark and with the end of the first lap the order was Ginther, Clark, Moss,

PHOTOGRAPHY: WEITMANN

Dan Gurney drove the sole 1960 Porsche, which looks bulky compared to the new car at right. It's front wheels also get less effective "bite."

New coil-sprung front end gives slimmer 1961 car more cornering power. Porsches surprisingly suffered from inadequate testing and preparation.

Brooks, Gurney, Bonnier, Phil Hill, Graham Hill, Trintignant and Surtees. By lap five Bonnier and Gurney were in third and fourth while Herrmann in the third Porsche was way back in the field trying to follow Brabham on his way up.

The Lotus challenge was broken when Jim Clark spun and subsequently made the first of a series of pit stops to try to correct ignition trouble and add water. Graham Hill's B.R.M. had fuel delivery trouble and also pulled up at the pits.

Bonnier left teammate Gurney to stay with Ginther and Moss in the lead. On lap 14 both Moss and Bonnier went past the Ferrari and the pace quickened. Moss lapped at 1:39.9 and von Trips did 1:39.8 putting the three Ferraris in team formation, Ginther 3rd, Hill 4th and von Trips 5th. Hot on their tails were the Coopers of McLaren and Surtees.

The American Ferrari drivers pressed their bid for the lead. Ginther lapped in 1:39.2 only to be passed on the 25th lap by Phil Hill who went on to attack Bonnier, surging past the German car in front of the pits. Phil Hill, chasing Moss, reduced the gap from 11.1 to 6.1 seconds in 21 laps. Ginther was close behind, repeatedly breaking the lap record with times of 1:38.2 and 1:38.0. He passed Bonnier and Ferraris were now second and third.

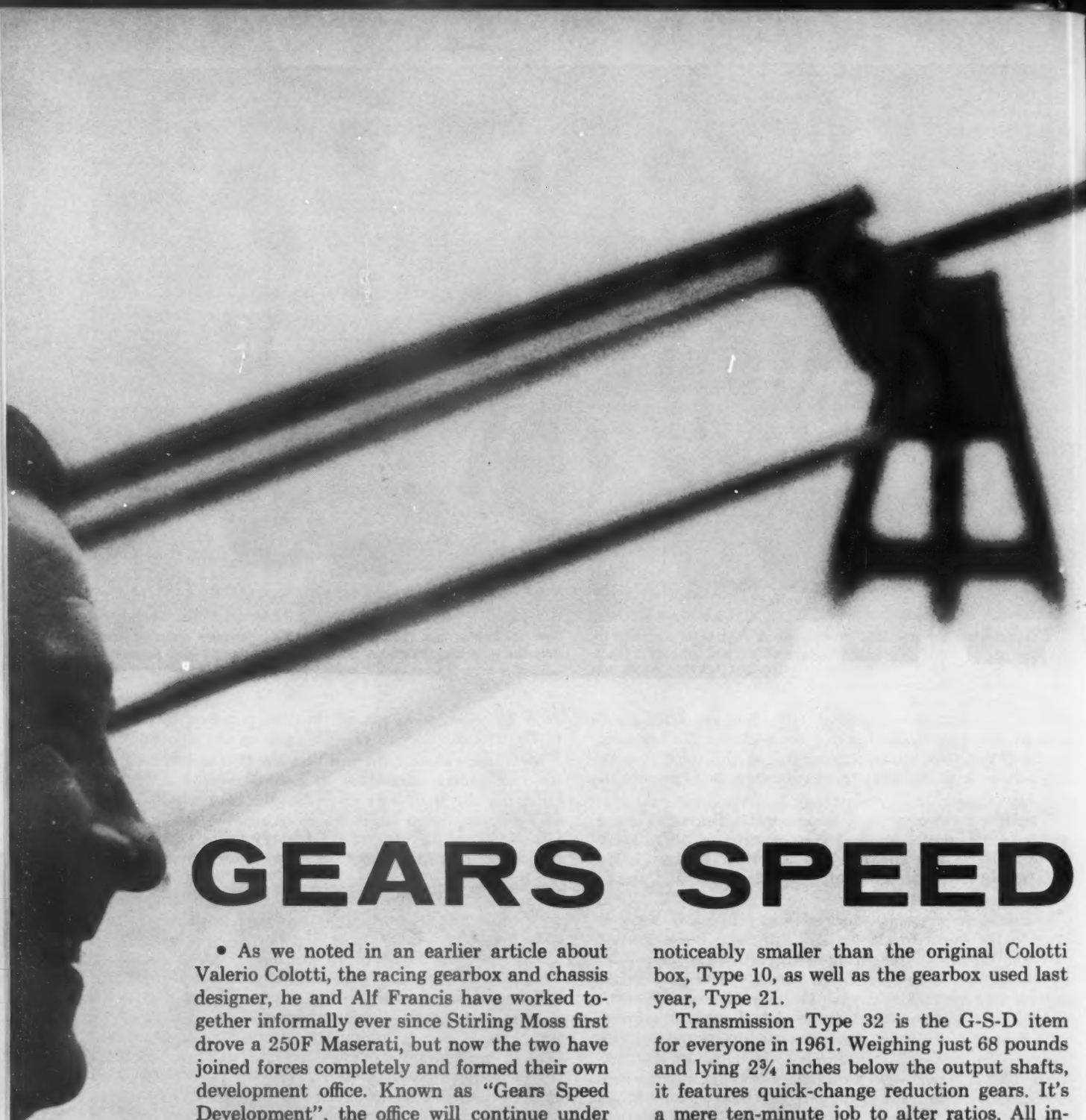
Herrmann's Porsche developed a fuel leak and stopped at the pits. Brabham retired his Cooper and by half distance both B.R.M.s were out of the race. Gurney was in sixth place and Herrmann ninth when Bonnier suddenly retired with fuel delivery trouble in the injection pump. He left the car near the chicane and walked back to the pits looking very angry. Porsche reliability is evidently not up to the reputation gained by the make in sports car racing over a period of years and the new air-cooled flat-eight will have to be both powerful and reliable to compare with the machinery lined up by Ferrari at Monaco. The red cars from Maranello gave an impression of complete dependability, never missing a beat, sounding just as fresh and crisp toward the closing stages as they did at the start. It's true von Trips couldn't keep up with his teammates, but the pace was so hot that by the 60th lap only six cars were still on the same lap.

Moss was widening the gap between Hill and himself and the race average continued to rise. Ginther was right on Hill's tail and must have given him the impression he could go faster, so after a bit of hand-waving they swapped positions, Hill pulling wide to the left before the corner at the bottom of the hill to the Casino to let Ginther through on the inside.

There were now ten cars left in the race and four were on the same lap. Moss and Ginther were about six seconds apart, more and then less as first one, then the other was held up by slower cars before reaching a point to pass. It was the hottest pursuit seen in a long time and must rate with the Hawthorn-Fangio duel at Rheims in 1953 in its sheer intensity. Ginther proved himself to be a tiger in the best tradition and teammate Hill carefully dropped behind. Ginther brought his lap time down to 1:36.3 on the 84th lap, reducing Moss's lead to 3.8 seconds. On the next lap Moss equaled this time and the gap between the two stayed at 3.5 seconds until they reached the finish line well within sight of each other.

Moss's feat in bringing his car home first is understandable in view of his intimate knowledge of the circuit. But this makes it no less admirable, particularly when it is remembered that the car is not the latest model although it does have a brand-new Climax engine. It was Moss's third win at Monaco. In addition to being first last year, he won for Maserati in 1956 at 64.94 mph and was leading in 1955 when his Mercedes-Benz blew up.

Ferrari is clearly in a period of *risorgimento* (see "Sicilian Spectacle," this issue – Ed.) and the opposition will have to improve before the Dutch G.P. at Zandvoort next weekend – where the Ferrari will be much more suitable than at Monte Carlo – if they wish to provide serious competition. The lap record for the track in the sand dunes currently belongs to Moss, of course, but not even a master can be counted on to perform miracles. Not all the time. *–JPN*



GEARS SPEED

• As we noted in an earlier article about Valerio Colotti, the racing gearbox and chassis designer, he and Alf Francis have worked together informally ever since Stirling Moss first drove a 250F Maserati, but now the two have joined forces completely and formed their own development office. Known as "Gears Speed Development", the office will continue under Colotti's leadership but with the additional assistance of Alf, whose practical knowledge of what is exactly needed on the race course is second to none.

"Our idea," said Alf, "was to fill this need for a gearbox development company. You could always get engines, you know, but transmission problems were always stickier and what Colotti and I want to do is to design something that does for everyone. Here's the drawing for the Type 29 box which we've sold to Colin Chapman." He pulled out a print of one of the latest of Colotti's designs, with provisions made for inboard disc brakes. It was small and short, noticeably smaller than the original Colotti box, Type 10, as well as the gearbox used last year, Type 21.

Transmission Type 32 is the G-S-D item for everyone in 1961. Weighing just 68 pounds and lying 2¾ inches below the output shafts, it features quick-change reduction gears. It's a mere ten-minute job to alter ratios. All internal parts of this gearbox have been previously tested in the Type 21; all gears are similar and it uses the sliding dog engagement system. For use in both Formula 1 and Intercontinental cars, the Type 32 sells for around $1500 in Modena.

Alf's opinion is that the Intercontinental Formula will die a quick death. He is not alone in this, with organizers not overly enthusiastic about running non-championship races for last year's cars. By the same token, race car constructors are not going to expend any extraordinary effort to develop cars for a Formula that does not count for the Championship.

Jesse Alexander, C/D European Editor, pays another call on Colotti and finds a renowned mustachioed mechanic lurking on the premises.

DEVELOPMENT

With this in mind, Colotti and Francis will be marketing by the end of '61 a brand-new transmission for use in Formula 1, 1.5 liter racing cars. Sliding dog engagement has been done away with, the actual changing being done by the gears themselves (sounds like the Weaver 1500 box to us—Ed.). Five speeds plus reverse and the reduction gears all in a space 7.2 inches long is quite remarkable. The reinforced magnesium casing is designed with the fact in mind that most cars will be using the half-shafts as wishbones. A built-in torsion drive shaft to withstand rending vibrations and torque from brutal downshifts, a Colotti feature since the Type 10, is retained on the new gearbox. Inspection of the gears is extremely easy, a feature which Alf was quick to point out. The Bologna firm of Amadori does the magnesium castings while all machining is done by a firm in Reggio Emilia.

Actually, as Alf told me, "Colotti is fed up with gears. What we actually want is to design our own racing car and we'll begin with an unorthodox Formula Junior which we hope will turn into a Formula 1 machine." Just how unorthodox this new car will be, neither Colotti nor Francis were willing to elaborate, but it was clear that a completely new racing engine was in the air as well. Knowing that Maserati were once playing with a flat twelve-cylinder, it would be no surprise if Colotti turned to a flat opposed layout for the Formula 1 design. The idea of Rob Walker commissioning G-S-D to do a Formula 1 car for Stirling Moss to drive is an enticing one indeed, and the fact that Alf works for R. R. C. Walker might be sufficient connection to effect this.

Colotti did design a racing car for Rob Walker in the winter of 1959-60, but the arrival of the new Lotus on the scene diverted the effort and the original Colotti design has only recently been completed. Too heavy for this year's Formula 1, the car, if used at all, may be seen in Intercontinental racing.

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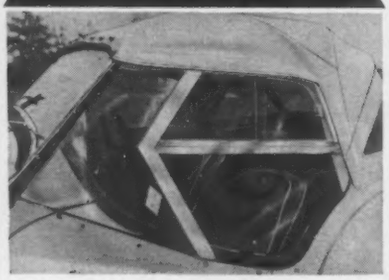

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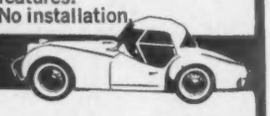

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DON'T-DO-IT-YOURSELF RACERS

Continued from page 25

Brown and Tony Vandervell, both of whom took the plunge into the F.1 whirlpool themselves at a later date, and A.C. Burdon of Automotive Products, which means Lockheed brakes, Borg and Beck clutches, Thompson ball-joints, Purolator filters. Vandervell, owner of a vast, single-purpose business, needs no more introduction than his product — the steel-backed shell bearing which not only stops the rods coming through the side of every British F.1 engine but has drawn public praise from Vandervell's onetime rival Ferrari. Even while the big Vanwall was racing, incidentally, the thinwall shells were used by all its serious opposition. For sheer universality Vandervell must scoop the pool. Up to the beginning of this year his score was 69 *Grandes Epreuves* (including all but Indianapolis in 1960), seven World Driver Championships, four World Manufacturer Championships, nine Le Mans and three Pan-American Road Races. The bearings are a standard production type, not designed specially for racing.

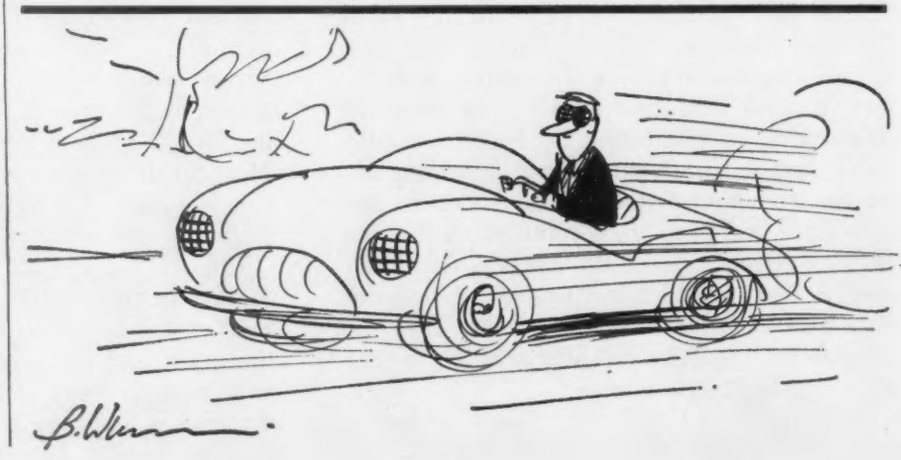
The chief contribution of Automotive Products is at least a specially adapted piece of equipment. Borg and Beck's 7½-inch dry multi-plate clutch, used on every British F.1 car, is a development of the single-plate unit which is equally universal on passenger cars. Another branch of the same group turns out Thompson tie-rod ends, from which only B.R.M. stands aloof in favor of its own design. Lotus and B.R.M. likewise hold fast to Automotive's Purolator oil filter; Cooper and Elva contract with the independent firm of Tecalemit.

Staying out of such detail work for the moment, however, there are some big items in the don't-do-it-yourself list, and a couple of them — let's be honest — make up for Italian and German indebtedness to Britain. There just doesn't seem to be anybody who can make a Climax engine breathe like Weber of Bologna, and there isn't anyone for the racing car designer's money who can build the insides of a limited-slip differential like the German firm of ZF. On the other side you can put the Dunlop Rubber Company and the R5 racing tire without which, as Dennis May pointed out in SCI last March, no 1960 racing car could afford to be. Whether Porsche will go for R5s, for German Dunlops or back to Continentals we cannot say at present. There's every indication that Ferrari, along with all the British constructors, intends to stick by Dunlop. In the case of B.R.M. both wheels and brakes come from the same source, and the Dunlop brake men will undoubtedly be sleeping easier this year now that a brake for each back wheel is *de rigueur*.

Outside B.R.M., the brake field is held by Girling, another offshot of the Lucas organization, which was the first to produce a disc brake suitable for comparatively poor man's racing, using a cast iron disc and light alloy caliper. There is less unanimity among constructors in deciding what kind of smell to produce when the brakes are applied. Lotus and Elva prefer the perfume of hot Ferodo, the trade mark adapted from the name of the late Herbert Frood who invented a mixture of cotton, rubber cement and resin for stopping horse-drawn carts some 60 years ago. (Frood's patent block was advertised as "much superior to old rope, leather, etc."). Cooper and B.R.M. buy their pads from British Belting and Asbestos Ltd., better known as makers of Mintex. For the facings of the clutch, however, Ferodo has the solid backing of all four.

The first time the Indianapolis cars came over for the late-lamented Monza 500, European race followers had their eyes opened to a lot of strange habits. One that anybody who had a paddock pass was apt to goggle at was the Americans' practice of covering up all the instruments before the race and telling the driver to go ahead and follow his nose. G.P. racing by contrast is a highly instrumental affair, where even the most meanly endowed driver can refer constantly to a tachometer and, when there's breathing space between corners, to gauges for oil and water temperature and oil pressure.

Not all designers have the same views on how much it is good for the driver to know. Those on the B.R.M. payroll are probably the least busy, with nothing to look at but the dials just mentioned. Cooper goes to the other extreme with a separate gauge for gearbox oil pressure and yet another showing the pressure of fuel between the camshaft-driven pump (aircraft type by



Chandler Evans, $70 worth) and the carbs. The complete range of instruments comes from another industrial octopus, with the old English name of Smiths, makers of everything from automatic transmission and heaters to car radio. Standing on the sidelines can give you an interesting view of the game. In Smiths' estimation Tony Vandervell must have more confidence in his drivers than other manufacturers have in theirs; the latest, tentative Vanwalls have gone over from chronometric to magnetic tachometer. Where does the confidence come in? With the magnetic type you don't get a maximum reading hand to show how big the driver's boot was when something gave way.

Smiths has another stake in the racing game through a subsidiary, KLG Sparking Plugs Ltd. (for Kenelm Lee Guinness, partner of Henry Segrave and George Duller in the Talbot-Darracq team of the 'twenties). Now that Aston Martin has left the business, KLG customers are B.R.M. and Vanwall. Lotus and Elva get their sparks from Champion, Cooper from Lodge.

The list doesn't stop there. In fact it goes on so long that we've tabulated all — or nearly all — the people who make their specialist contribution to Formula 1. Some, like the brake companies, are so deeply involved as to produce components purely for racing, though this can be looked on as a step in their passenger-car research program. Others make bits that have strayed far enough from their original purpose to curl the designer's toes. The front suspension posts of both Lotus and Elva, for example, come from the drop-forging firm of Alford and Alder, and if you happen to have your Triumph Herald in the paddock when Colin Chapman is looking urgently for a spare an easy path to glory lies open, because the Herald is what the forgings were first made for. If you run an Anglia there is still hope; by an odd coincidence its clutch release mechanism fits a Lotus like a glove.

Earlier we pointed out, referring particularly to the engine, the advantage of getting ready-to-wear supplies from people with the resources to perfect their own product. In the case of components which have to cope with special problems, varying from circuit to circuit, there is a further excellent reason for calling in outside help. May outlined the work of the Dunlop team who pursue the G.P. circus 'round the world with instruments, notebooks and advice for the customers who run on R5 tires, which means almost everybody. The same goes for brake and brake pad representatives, spark plug experts and — though maybe in a more social capacity — the men from the fuel and oil companies. Practice days are the time to see Ferodo and Mintex, Dunlop and Girling, with dirty hands and micrometers.

Publicity, of course, is good for any firm, but racing for the people in this industry is an extension of their own laboratories where they build up a stock of knowledge that can't be had any other way. For the racing car builder it means an expert on hand to fit new linings or (in the case of drums) skim them to size, or a man who can free one of the regular mechanics for other work in an emergency pit stop (since we are concerned with the British we take this opportunity, too, to recommend the green Ferodo race service van as an unfailing source of cups of tea). Spark plugs are equally the province of the expert. However good the legendary racing mechanic, he can't hope to know as much about plugs as the rep. from a firm which makes nothing else.

With oil it is a little different. For one thing the most chauvinistic oilman will tell you, though not in front of a microphone, that one reputable brand is as good as the next. For another, there is little that the specialist on the spot can do except operate his cornucopia of unlimited supplies. Probably the thing which distinguishes the oil companies most of all is the size of the checks they write, for this is one case where subsidies do not just come in kind. It's no exaggeration at all to say that without Shell, BP and Esso there would be no Grand Prix racing on the modern scale.

From all of this you might be tempted to ask what the men who put their names on the finished product put into it. The answer (B.R.M. possibly excepted, since they depend less than most on outside supplies) is about 50 feet of steel tube, some casting and welding and a lot of thought. Nothing, you'd say, that anybody couldn't run up in his back yard. It's a funny thing, though, the way even in Britain back yards go on outnumbering Grand Prix cars. And Esso and Shell for midnight burning aren't *that* expensive. —*RBB-S*

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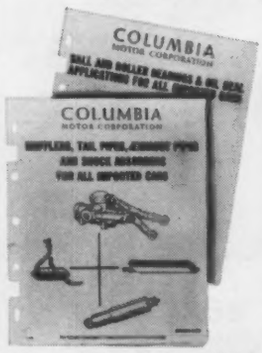

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BEAUTIFUL BRUTE

Continued from page 22

Late 1953 found Chrysler's 1954 models stars of a press preview at the then-recently-completed Chelsea Proving Ground. Chrysler promotion included a 24-hour run by a V8 New Yorker. A number of drivers took part, but it was Tony Bettenhausen who clipped the checkered flag to conclude the 24-hour spin averaging over 118 miles per hour. Luckily the run finished when it did, for reports have it the engine was almost out of bearings, which is one reason early 300s had heavy-duty "tri-metal" inserts for both rods and mains.

In building cars for the 1954 Mexican Road Race, Chrysler was continuing a development program soon to produce the Chrysler 300. The "High Output" cars built for Pan-American racing were two-door New Yorker sedans, said to have had the optional 235 horsepower engine. But a Chrysler engineer's chance remark, "These were very lively jobs," leads observers to believe that Pan-American '54s used the 1953 roller tappet engine, rated well over 300 horsepower. Support for this observation lies in the fact that 1954 road race cars were capable of 135 to 140 mph. A New Yorker with the optional 235 horsepower engine could only limp along at 125 mph.

Production of 1954 Pan-American Road Race cars began when Chrysler ran a group of "Optional Equipment" New Yorkers down the Jefferson Avenue production line. Once past inspection, they were elevatored upstairs to a special work room where Tony Bettenhausen and Briggs Cunningham watched chassis and body refinements. As one Chrysler man recalls it, "They'd say 'You need stiffening here.' So we'd put plates on the frame and body panels until hell wouldn't have it. One thing about it, those cars were really solid."

The New Yorkers were sold outright, with engine and transmission left stock for modifications by the purchaser. One of them won NASCAR's 1954 Grand National by averaging 89.14 mph for 160 miles. Only 15 "Optional Equipment" Chrysler New Yorkers were built at the Jefferson Avenue plant during 1953 and 1954.

Though Chrysler showed him its 1954 models, Briggs Cunningham did not complete a new series of white and blue cars to run the 1954 Le Mans race. Two of the three 1954 entries were veterans of previous events. The solitary new car was a 4.5-liter V12 Ferrari with a special body and liquid-cooled brakes. The two veterans ran V8 Chrysler engines, now Solex-carbureted to give 330 horsepower, good for 160 miles per hour and acceleration from 0 to 110 miles an hour in eleven seconds. In the race, the Ferrari was soon out with a broken rocker arm. Repaired in less than an hour, the car was to retire with a seized rear wheel bearing.

The old C-4R warhorses did remarkably well, finishing third and fifth behind the epic Ferrari-Jaguar duel that was finally won by Ferrari.

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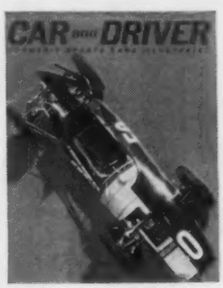

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By 1953, Exner was styling the exciting 1955 cars. But when he showed a ⅜-scale model of the new series, it was slow to find acceptance. Some management people couldn't stand Exner's idea of clean design. In one case, an unhappy executive actually ordered the ⅜-scale model removed. Fortunately his orders were never carried out because well-styled Fords and Chevrolets were already set to battle so strongly for 1954 sales that the boxy Plymouth would be knocked from third to fifth place behind Buick and Oldsmobile. In fact, the Corporation's 1954 sales were so bad that Chrysler dropped seven percent of its penetration in one year, to a new low of 12.91 percent of all industry sales. The Corporation badly needed better-looking cars to regain lost business. It was a lucky break that Exner had gained approval in time. Even then, delays forced a "crash" program which cost Chrysler Corporation $250 million to get Exner's beauties ready for the 1955 model year.

One autumn day of 1954, Chrysler Division's Chief Engineer, Bob Rodger, suddenly realized that the upcoming entirely new 1955 series, plus hundreds of letters from Chrysler buyers looking for more power, conversations with Cunningham, and valuable engineering data from the Indianapolis V8s could be combined into a wholly new form of transportation. Shortly after noon, when he hoped the boss would be in a good mood, Bob cornered E. C. Quinn, then manager of Chrysler Division. All Bob needed was permission to have preliminary data prepared for a high-performance Chrysler product, a car he was sure would strengthen the image of quality engineering already enjoyed by Chrysler automobiles.

(*Continued next month*)

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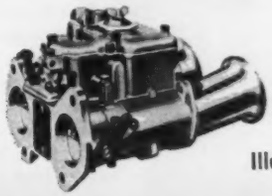

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PART-TIME TIGER

Continued from page 52

sion, a damaged kidney and intense admiration for Cunningham's forbearance. Although Hansgen was a newcomer to the team, he says Cunningham overlooked the new pile of expensive junk and "about all he said was that he was glad I was still alive." Since then Hansgen has formulated and followed a more prudent racing policy.

Like many other drivers, notably Tony Brooks, Hansgen's spirited motoring began in a Healey Silverstone. That was in 1950; in 1951 he bought a Jaguar XK120 and trundled up to Bridgehampton for his first race, where he caromed off assorted hay bales and into third in class. The next year he drove a Jaguar coupe owned by a friend and in 1953 he signed up for George Tilp's Aston Martin, which during the latter part of the year swallowed a 3-liter Offenhauser engine. In 1954 he bought a C Jaguar and for the next two years began building a name for himself with consistent victories in regional events.

The big year for Hansgen was 1956. It started moderately well with a class victory at Sebring—or, looking at it another way, the factory Corvette he and John Fitch drove was the only car in its class to make the distance. Then began a phenomenally productive stint with Auto Engineering, a Boston Jaguar sub-distributor. Production Ds had begun arriving in the United States and Auto Engineering had one prepared by Lindy Hansen in meticulous fashion. Hansgen started seven races in the car and he was first across the finish line every time. Two races stand out.

At Thompson, Connecticut, he stacked his D against Carroll Shelby's big Ferrari, 16 straight victories and justifiably lustrous reputation. In the Sunday one-hour race Hansgen got the jump at the start and in order to catch up Shelby hit the accelerator so hard he broke the linkage. In the big race on Monday Hansgen was again first off the mark. And again Shelby pressed too hard. On the first lap he lost it and went off the course; then, gaining on Hansgen, he pressed harder and lost it again, this time on top of a sandbank—permanently.

The biggest race and the turning point in Hansgen's career was at Cumberland. It was Hansgen's production D against the formidable Cunningham equipe: three factory Ds with Fitch, Cunningham and Sherwood Johnston aboard, and a production D with C. Gordon Benett. The race itself wasn't particularly dramatic; Hansgen won in a breeze, lapping everybody but Jack McAfee in a factory Porsche RS.

What happened after the race is a measure of Hansgen's civilized approach to racing. He had been approached by Cunningham before and now he most definitely had a job for the asking. "But I didn't think it would look right," says Hansgen. "Nobody knew I had talked with Mr. Cunningham before and to them it would just look like he was buying a driver . . . buying out the opposition." So Hansgen

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stayed with Auto Engineering for the rest of the season and, as he hastens to add, enjoyed it immensely. "The car was prepared right, it was sanitary," he says. "They worked very hard on the car, I enjoyed working for them and so I think I tried a little harder to win."

It was also during 1956 that Hansgen's successful sporting life with Jaguar developed into a productive commercial enterprise. He opened a dealership in Westfield, New Jersey, not far from Bedminster where he lives with his wife Beatrice Ann, daughter Beverly 16, and son Rusty, 13.

In 1957 Hansgen signed on with Cunningham; in the Spring Sprints at Elkhart he almost signed out. The reason for Friday's flip, which didn't hurt him, was that "I was just pushing too hard," says Hansgen candidly. *Scratch one D.* Saturday was eventful, in retrospect, in that the D supply was not diminished. After Saturday came Sunday. "I was running third or fourth, dicing with Lou Brero in another D and I saw that Sherwood had flipped bad. Scratch *two Ds.* I thought he had cashed his chips. But then I saw him waving and I was so elated I forgot that I was supposed to be driving. I ran off the road and got stuck. It took me a while to get going and I got madder and madder at myself. I was trying to pick up Shelby and my right rear brake got so hot it locked up and I flipped. How many times? I don't know. Too many times!" *Scratch three Ds.*

Cunningham's forbearance was rewarded. Hansgen went on to win the SCCA championship and to repeat for the next two years. In 1960 the Cunningham team journeyed west for the well-attended, well-paying professional races and Hansgen missed a clear shot at his fourth title in a row. The trip was far from wasted, however. With a Type 60 Maserati and a Cooper Junior, Hansgen blew off all the West Coast's highly-touted small-bore drivers.

While winning his third straight title in 1959 Hansgen took time out to fill in the picture of American racing etched so brilliantly abroad by Hill, Gregory, Shelby and Gurney. British club racing is the basis for Britain's great international triumphs and it is also a fantastically competitive world of its own. Some hot sedan racers consider their skills and their league perhaps a bit better than the Grand Prix circuit, and certainly more sporting. Into this really "in" group dropped an unknown Yank who mopped up in two major sedan races and trailed Stirling Moss in the Silverstone sports car race until his clutch failed. Hansgen's 3.4 sedan, owned by John Coombs, had been "arranged" by the Jaguar factory, but in some circles in Britain, Walter Edwin Hansgen is America's most noteworthy driver.

Hansgen is back mopping up on this side of the Atlantic these days and says he intends to stay here most of the time. "Driving's still a hobby, I can't afford it any other way," he says, and he definitely is not the sort to take a wild fling at the European circuits. The businesslike approach is too much a part of him. So it's likely that Hansgen will continue on his straightforward, genial way to U.S. racing victories, unless, of course, somebody waves that red flag. —*SMcN*

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SICILIAN SPECTACLE

Continued from page 28

very calmly, using the car's power to best advantage when passing traffic in a manner which Gurney commented on afterward. On the 26th lap Baghetti was balked by slower cars and Gurney nipped by into the lead – only to be promptly repassed. Baghetti, with Gurney always close behind, kept the lead till the end, lapping third-place Bonnier in the process. Gurney claimed the fastest lap of the day on the 53rd tour (1:54.9) and on the 56th and final round was almost about to lap Bonnier too.

Baghetti, despite the fact that his car was the fastest in the race, deserves full credit for his win. He was never out of danger – Gurney saw to that – yet he never made the slip that might have been expected of him considering his inexperience.

The race definitely proved the Ferrari to be the car to beat, at least on a fast course where it has a decided power advantage and road holding equal to its competition. Gurney's performance showed Porsche is not to be discounted as a threat, however, while Cooper and B.R.M. appear to have quite a bit of development work ahead. Meanwhile, there's that new 120° V6 in Maranello . . . it should be an interesting season, not only in the G.P. cars but in sports cars too, as we were able to discern at the Targa Florio the following weekend.

As a test of driving ability, driver durability and the amount of punishment a car can take in white-hot competition, there is no equal in sports car racing to the annual Targa Florio. The 45th event in the series which was started in 1906 was run on April 30 and again counted for the manufacturers' championship. It consisted of ten laps over the traditional 45-mile *Piccolo Circuito delle Madonie*. A pre-race tour of the circuit revealed road crews had been busy in the Madonie mountains this spring, filling in the larger potholes, erecting guardrails on the outside of some of the more dangerous corners and even widening a few curves. However, the road remains basically the same, which is pretty awful.

At almost any point on the circuit you can experience the atmosphere that belongs solely to an open-road race. In the villages you learn that almost everyone has a relative in America but it appears doubtful if many would trade places with their emigrant relations on race day. In the mountains and at the *bivios* happy Sicilians start collecting before 3 a.m. on race day and are well and volubly informed concerning the competing cars and drivers. They are extremely vociferous in encouraging their favorites who are usually in red-painted cars.

As last year, the struggle for top honors was again between Porsche, Ferrari and Maserati. Porsche, determined to repeat its 1960 success, arrived fully-equipped even to radios for communication between the pits and the team's signaling station out on the circuit.

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The Stuttgart lineup was comprised of three RS roadsters and two Abarth Carrera coupes. The RS of Bonnier and Gurney was powered by a 1978 cc version of the familiar four-cam aircooled four, while that of Herrmann and Barth had a 1678 cc engine. The Bonnier/Gurney car was brand new, still unpainted, and was distinguishable from the other RS roadsters by its sharper nose and the "roof" over the carburetor air intakes which gave it a humpbacked appearance. The third RS, driven by Moss and Graham Hill, was entered by Camoradi but was factory maintained. This car and driver combination was considered by many pre-race observers to be the best bet. The car's original 1678 cc engine was removed the day before the race and a 1978 cc unit substituted, the thought being that while there was little advantage in overall performance, the increased torque of the larger engine reduced the number of gear changes required.

One of the two Abarths was owned by Strahle while the other was a factory car. During the race the Strahle machine had three drivers, its owner, team manager von Hanstein and Linge, while the other Carrera GTL was driven by Linge, Pucci and Strahle. Targa rules permit a driver to drive more than one car so Strahle and Linge each drove both GTLs during the race.

Ferrari entered three cars, two rear-engined 246-Sports powered by dual-overhead-cam, 2417 cc V6s and one three-liter front-engined V12 Testa Rossa with independent rear suspension. The new rear-engined cars were assigned to Phil Hill/Gendebien and von Trips/Ginther while the Testa Rossa was to be driven by Ricardo Rodriguez and Willy Mairesse. While Porsche drivers had a spare RS "*muletta*" for practice along with various production Porsches (including two prototype two-liter Carreras), Ferrari drivers had to confine most of their practice to touring the course in Fiat 600s.

Scuderia Serenissima, based in Modena and managed by Ugolini, entered two new rear-engined Maserati Type 63s. Targa veteran Umberto Maglioli was paired with Giorgio Scarlatti and the second Birdcage was driven by young Nino Vaccarella from nearby Palermo (who probably knows the Targa circuit better than anyone) and Maurice Trintignant who was driving the Targa for the first time. Serenissima also entered a two-liter Type 60 Birdcage to be driven by Boffa and Todaro.

Except for a four-hour period on the Friday before the race, all practicing is done under normal everyday traffic conditions — normal for Sicily, that is. As usual the "unofficial" practice left in its wake some bruised and frightened livestock and shaken Fiat owners. (Dan Gurney and Richie Ginther, comparing notes later, believed they had both nicked the same and obviously rugged dog.) Mairesse left the road in the Testa Rossa on the descent to Collesano, bending the bodywork which was straightened in time for the race; he was unhurt.

The Friday session clearly indicated that Moss's 1958 lap record of 42:17.5, set in an Aston Martin, would not stand for another year. This was borne out in the race. It not only fell — it crashed, being battered no

(*Continued on page 76*)

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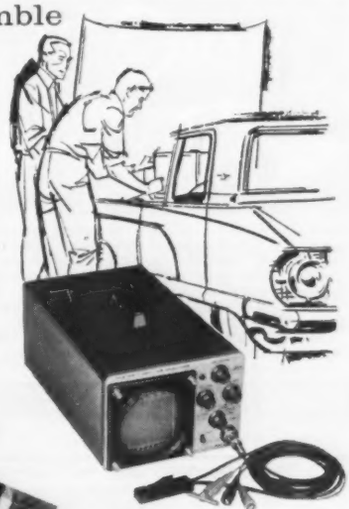

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(*Continued from page 75*)

less than twenty times!

The race started at 7 a.m. Sunday with the departure of an Alfa Romeo Giulietta which was followed at 30-second intervals by 53 other competitors. From the drop of the flag, Moss began to demonstrate again his mastery of the art of open-road racing. His standing lap was completed in 42:18.6, only 1.1 seconds away from the record. On the second lap Moss, von Trips and Bonnier all beat the old record. By the end of the fifth lap, when he turned the Porsche over to Graham Hill, Moss had increased his lead to the extent that he was ahead on the road as well as on elapsed time.

Meanwhile the Ferrari team, with the exception of von Trips, was in trouble. Phil Hill, starting last behind Rodriguez and von Trips, had caught and passed his team-mates halfway around the first lap—which he never completed. Coming out of a corner too quickly, Hill's Ferrari left the road, splaying the front wheels and shortening the wheelbase. He was unscratched and was sitting by the side of the road drinking a glass of milk when the other Ferraris repassed him. Three laps later Rodriguez withdrew with a broken rear suspension so at the end of four laps there was only one Ferrari to challenge the Porsches.

The rear-engined Maseratis never seemed to handle right and were unable to worry the three Porsches and the Ferrari. The consensus was that the Type 61 front-engine Birdcage would have been much more of a threat on this course.

At the end of four laps von Trips, in third place only five seconds behind Bonnier, handed the car over to Gendebien who was substituted for Ginther because of his better knowledge of the road. The Belgian really began to put on the pressure immediately and by the sixth lap was leading the race to the delight and chorus of thousands of Sicilians shouting *"Forza!"* as the Ferrari roared by. Two laps from the end, having made an unscheduled and unnecessary refueling stop at Bivio Polizzi, Gendebien, now in second place, relinquished the car to von Trips. Moss, having taken over from Graham Hill, was once again in the lead but was losing ground to the charging Ferrari as the inspired von Trips began making up the more than one minute deficit. Midway around the final lap, he was less than 40 seconds behind and still gaining. With the fast sea-front straight still ahead, it looked like it was going to be a very close finish.

Moss, with less than four miles of the easiest part of the course to cover, ground to a halt with a wrecked ring and pinion. Seeing his rival stopped, von Trips eased up slightly to insure his own arrival as he himself had suffered the same fate as Moss on the last lap of the 1959 Targa Florio when he was in the lead. Nevertheless, his last lap this year was the fastest of the race, a sensational 40:03.4. What the result would have been if Moss's car lasted the few remaining miles is a matter of conjecture—one thing is certain, however, it would have been exciting. As it was, the wear and tear on the Sicilians' emotions and the nerves of von Hanstein and Ferrari team manager Tavoni was considerable. —*PC*

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(*Continued from page 11*)

urally excellent, with light pedal pressure even without servo assist. It takes really hard braking to show how much better they are than drums. In a panic stop the discs seem to repeal a few of the basic laws of physics. To sum up the new Fiat's road manners: they are not sporting – by Italian standards – exhibiting understeer at medium to fast cornering speeds which changes to oversteer when the limit is reached.

While visiting the factory we took the opportunity to have a short talk with Aurelio Lampredi, vice director of passenger car engineering at Fiat, and former chief engineer with Ferrari. The 54-year-old Lampredi does not regret his move to Fiat, feeling that the "golden age" of motor racing has passed.

Lampredi discusses the Weaver 1500 during talk.

Lampredi's engineering career has been a varied one. Starting on aircraft engines at Piaggio and Reggiane before and during the war, he then went to Ferrari, spending eight and a half years there interrupted by a brief ten-month stint with Isotta-Fraschini. During his stay at Maranello, Lampredi designed at least 38 racing engines, including a 120-degree V6 in 1948. Enzo Ferrari shelved this one at the time because of its radical layout! Over the years Lampredi improved the specific output of Ferrari engines from 50 bhp per liter to 110 bhp per liter. Much of this increase can be traced to the intensive work he did on intake and exhaust cam profiles.

The modest engineer is most proud of his 4.5-liter Formula 1 engine that beat the then-all-conquering Alfa-Romeos several times in 1951. Lampredi's racing engines have all followed his four basic bench marks for that type of power plant: 1. Efficient intake and exhaust systems; 2. The use of as little cooling water as possible consistent with eliminating hot spots; 3. Great rigidity; 4. Lowest possible weight.

Despite his years spent as a one-man engineering office, Lampredi is quick to point out that having one big brain doing everything is not convenient and that teamwork, as it is applied at Fiat, brings the greatest results. Lampredi's answer to the question of whether or not he would ever return to racing revealed his love of the sport and his Latin approach to life: "I shall never go back to racing, despite the fact that I still follow it; the golden age of racing is over and, like breaking with a woman, it should be a final unconditional break." —*C/D*

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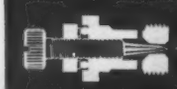

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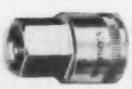

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ROAD TEST: LANCIA FLAMINIA

Continued from page 33

rolling of the body on its suspension. A favorite amusement among Lancia owners is treating their passengers to a brisk spin over twisting roads. The cornering speeds can seem hair-raising to the passenger but to the driver they are nothing. The car is tremendously sure-footed and when the limit of its adhesion finally is approached the rear end begins to come around in a gentle warning.

Where maneuverability is a factor the Flaminia can traverse distances effortlessly and securely at very high average speeds thanks to excellent steering, road holding and brakes. Lancia's drum brakes always have been among the best but our G.T. coupe was equipped with optional Dunlop discs. These incorporate a vacuum servo assist (no reservoir) and are without doubt among the best brakes ever put on a road machine. They are wonderfully smooth, positive, quick and fade-free. Required pedal pressure is light at all times but there is no tendency for these brakes to grab or to exhibit any erratic behavior. They produced some of the highest and most consistent deccelerometer readings we have encountered, inspiring a high level of confidence.

Though the passenger is well taken care of in the roomy cockpit, the Touring coupe is primarily a driver's car. The rear-mounted transmission gives a great amount of freedom to move and the pedals are well-spaced for fast motoring. Even near the ragged edge only small steering wheel movements are needed to maintain control as the final oversteer makes itself felt.

Another factor in the Flaminia's ability to sustain high average speeds is the ease with which its suspension smooths out surfaces that would tear the undercarriage from many cars. The ride is never harsh although high-frequency bumps are very palpable. But, for example, railroad crossings that shiver the timbers of most cars do not faze the Flaminia and large dips, ruts and bumps can be ignored by the driver just as they are by the car. Immense shock absorbers, a de Dion rear end with inboard brakes and low unsprung weight all pay off here.

A modicum of agility is required in entering and leaving the Flaminia coupes, though not in the case of the sedans. Headroom in the Touring coupe is minimal and slightly better in the bump-top Zagato coupe. The well grouped instruments include an oil temperature gauge.

The Lancia Flaminia G.T. Touring coupe has a suggested base price of $6485. Extras are leather upholstery, $112; disc brakes, $150; dealer preparation and handling, $100. Taxes and other incidentals push the initial investment beyond the seven-grand mark making this—in the Lancia tradition—a choice for the connoisseur, not the seeker of mere transportation.

—Griff Borgeson

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